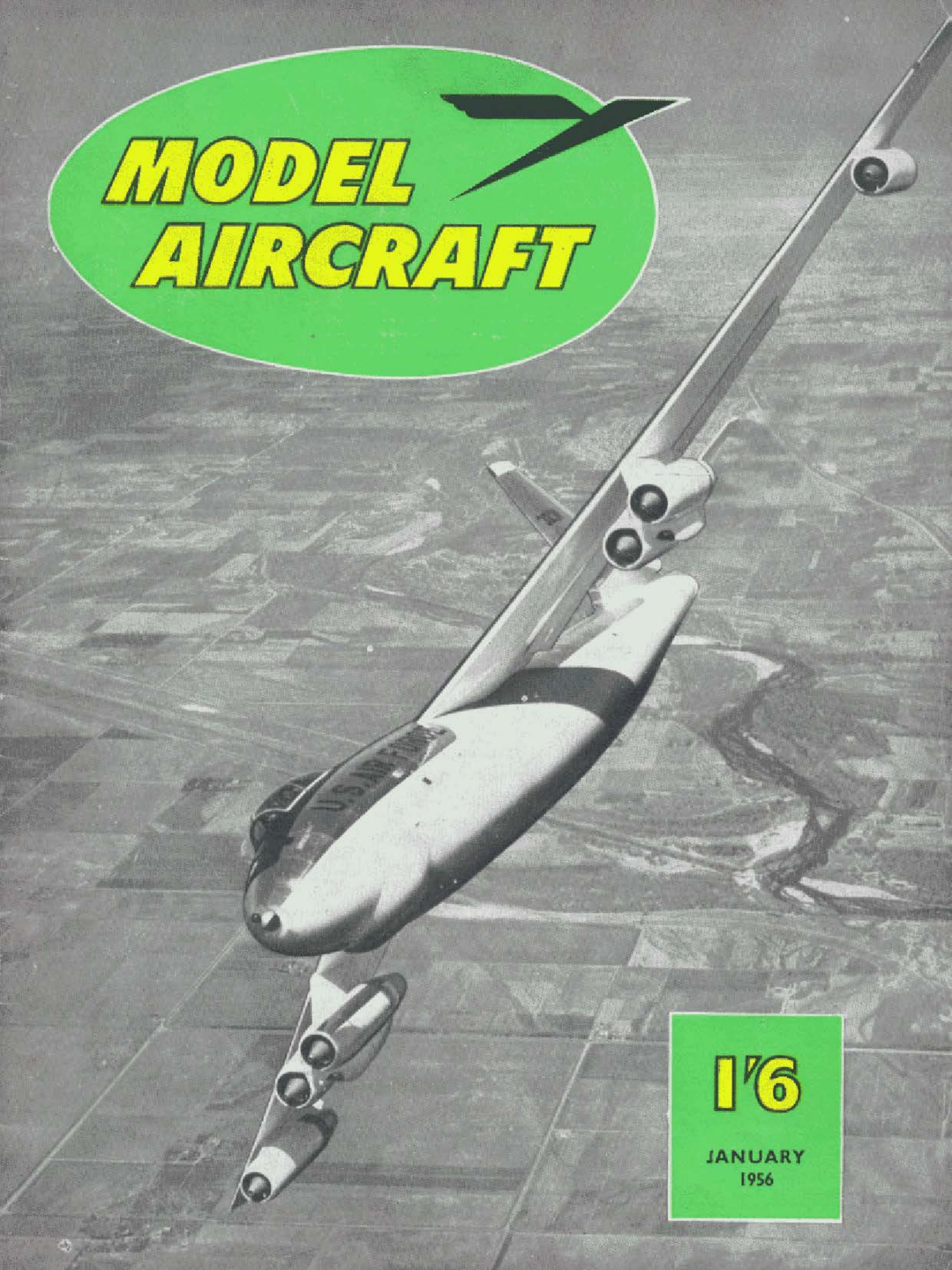
MODEL AIRCRAFT



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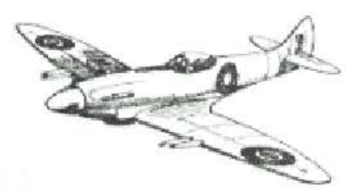

SPITFIRE

SPITFIRE
HURRICANE
TEMPEST
TYPHOON
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D.H. BEAVER
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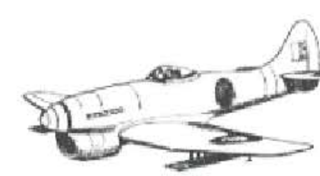

TEMPEST

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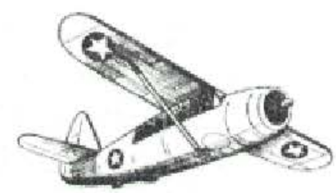

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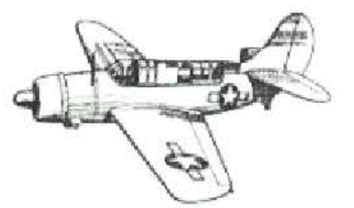
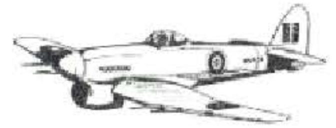


HELLDIVER



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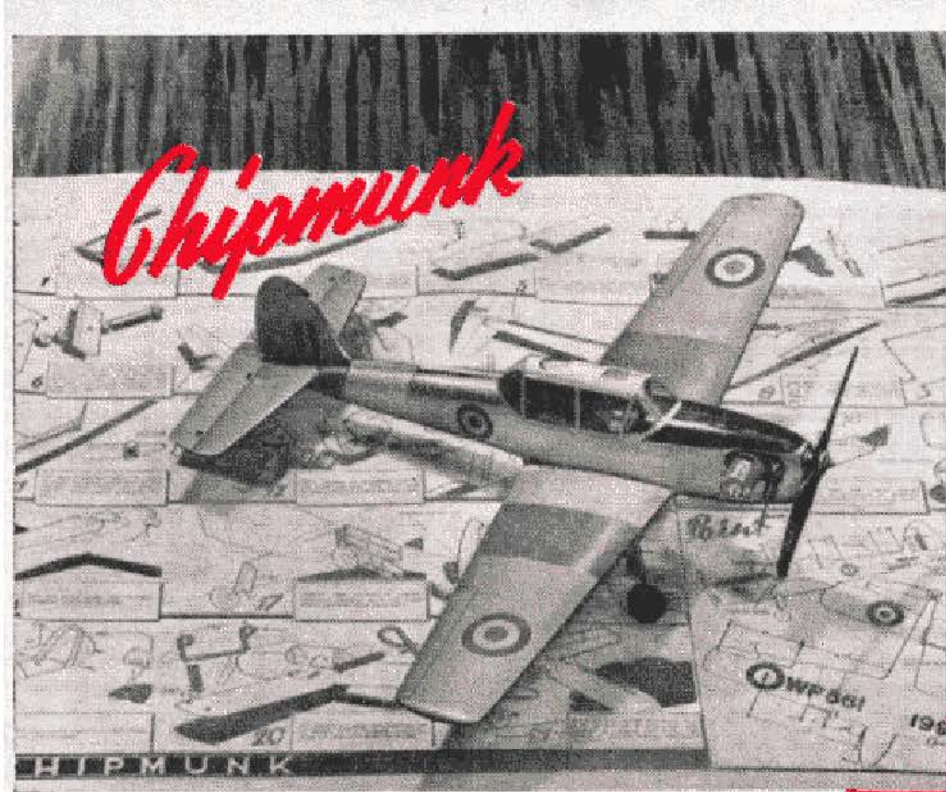

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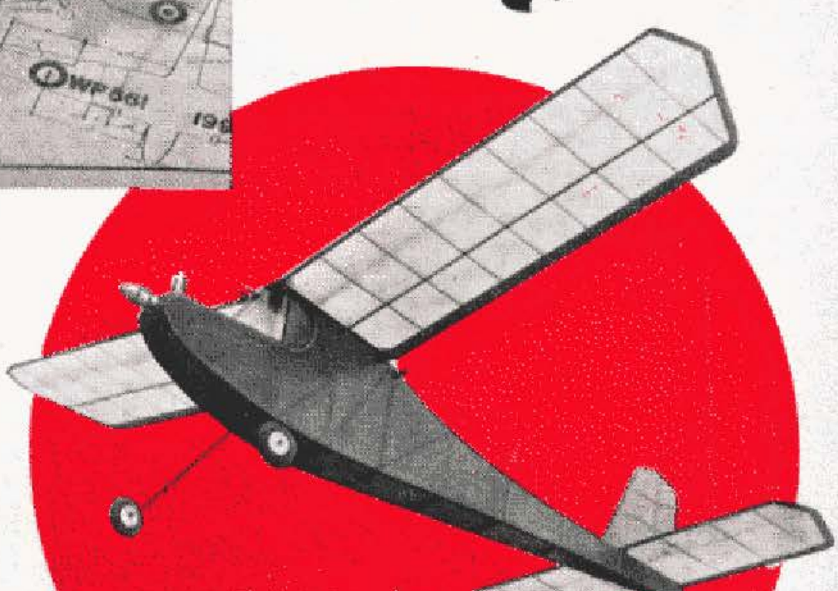
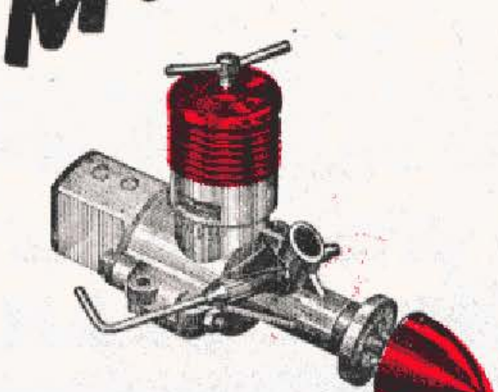


Both for the SUPER MERLIN



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An accurate replica of the Duke of Edinburgh's own trainer with authentic registration letters and markings supplied on a sheet of first-class transfers. Model features a torsion bar undercarriage and the kit is complete with wheels and special metal tank parts ready to solder, the wing is pre-shaped and all other parts superbly printed on the highest grade balsa. Outstanding feature is the schematic stage by stage instruction sheet, which makes assembly ridiculously simple. Price including tax **15/-**

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Fit this model with a Super Merlin and you have the perfect combination for a first power model. Construction is simplicity itself, the kit including accurate printed parts, shaped trailing edges, etc., all on satin smooth top grade balsa. Big feature of this design by Vic Smeed is its foolproof performance. Even the inexperienced beginner will find it difficult to prang, yet nifty performance can be achieved up to contest standard. Price **16/6**

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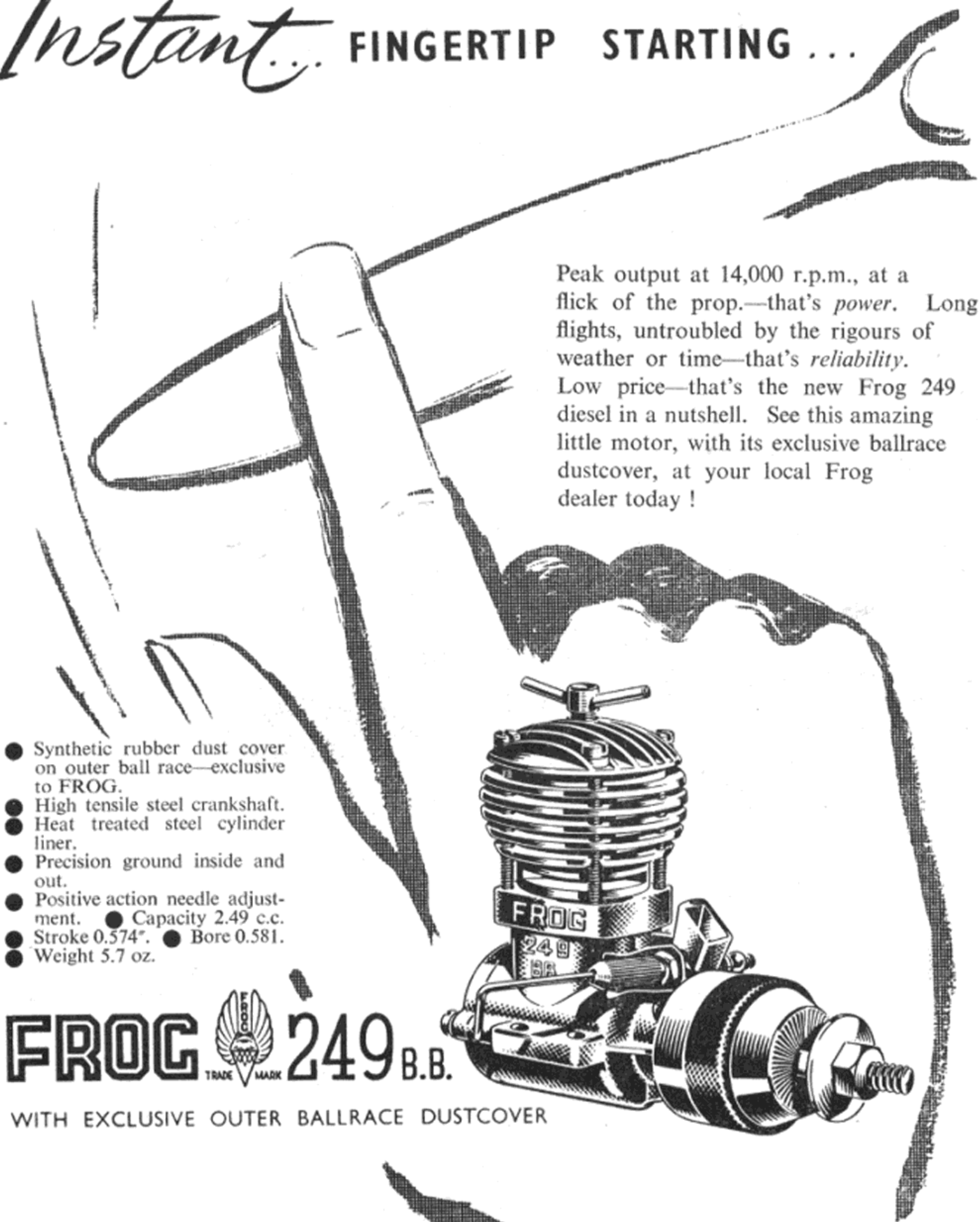

Peak output at 14,000 r.p.m., at a flick of the prop.—that's *power*. Long flights, untroubled by the rigours of weather or time—that's *reliability*. Low price—that's the new Frog 249 diesel in a nutshell. See this amazing little motor, with its exclusive ballrace dustcover, at your local Frog dealer today !

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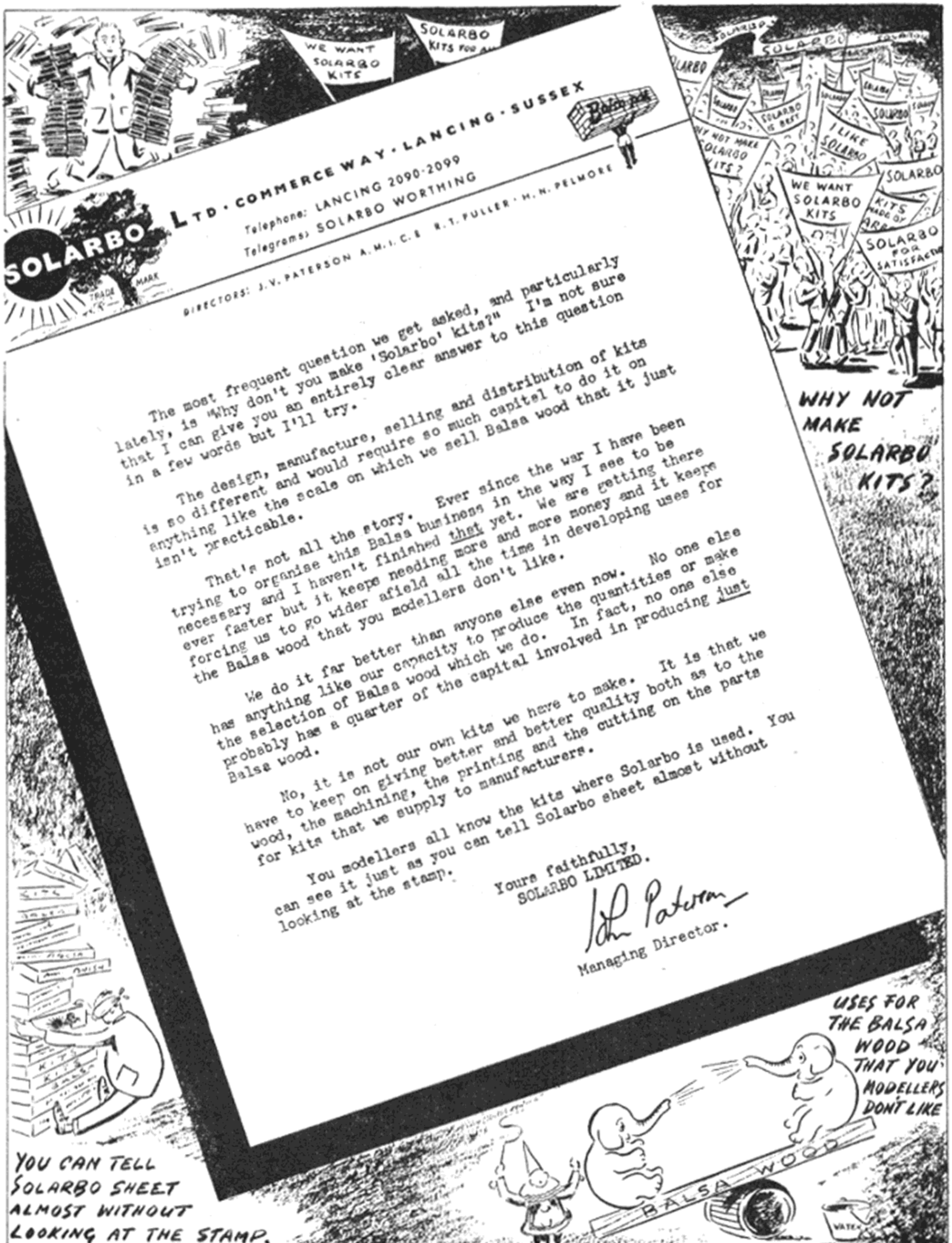

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The most frequent question we get asked, and particularly lately, is "Why don't you make 'Solarbo' kits?" I'm not sure that I can give you an entirely clear answer to this question in a few words but I'll try.

The design, manufacture, selling and distribution of kits is so different and would require so much capital to do it on anything like the scale on which we sell Balsa wood that it just isn't practicable.

That's not all the story. Ever since the war I have been trying to organise this Balsa business in the way I see to be necessary and I haven't finished that yet. We are getting there ever faster but it keeps needing more and more money and it keeps forcing us to go wider afield all the time in developing uses for the Balsa wood that you modellers don't like.

We do it far better than anyone else even now. No one else has anything like our capacity to produce the quantities or make the selection of Balsa wood which we do. In fact, no one else probably has a quarter of the capital involved in producing just Balsa wood.

No, it is not our own kits we have to make. It is that we have to keep on giving better and better quality both as to the wood, the machining, the printing and the cutting on the parts for kits that we supply to manufacturers.

You modellers all know the kits where Solarbo is used. You can see it just as you can tell Solarbo sheet almost without looking at the stamp.

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JANUARY 1956 No. 175. VOL. 15

Contents

Cover Story

The flat countryside of Kansas forms a backcloth for the antics of this Boeing B-47E "Stratojet" bomber, finished in the latest U.S. Air Force colour scheme. Its six General Electric J47 turbo-jets give it a top speed of around 630 m.p.h., and it has a normal bomb load of over 20,000 lb. The three-man crew are all accommodated in the forward fuselage, the two 20 mm. cannon, providing a sting in the tail, are radar-operated. This B-47E forms a fitting subject for the cover of this issue, which, on page 6, contains the first article of a new series on jet propulsion and the model.

THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

Dean no Dandy

DEAR SIR,—After reading the comments dealing with "smart appearance on the contest field" (November issue)—under heading of "Just Dandy"—I spring to the defence of those individualists who appear at *even* International Contests in unconventional garb.

At this year's Internationals in Germany, I was simply delighted to see Michael Gaster (Power winner, in old flannel bags) and Rudolf Lindner (Glider winner, in beat-up white shorts) winning against some of the toughest competition ever—including, I hasten to point out, some really impressively uniformed teams.

It is worth remembering that uniformity of dress is frequently allied to uniformity of thought—witness the panic caused when I asked a member of the identically clad "X" team for details of his model. Up galloped his team manager right away to make sure that he did not say anything "out of line." Needless to say, I was *not* reflecting on the relative smartness of their team and ours, as I walked over to a sunnier part of the field.

I must confess that my heart always warms to those uninhibited youngsters who go in for those weird and wonderful "modellers' hats." By the same token, I find that the most memorable contest-fliers are those like the late Sid Allen (always the same old zip-jacket), "Stoo" Steward ("most oil-soaked trousers at Fairlop") and Dave Kneeland (wore a vivid sports shirt to Cranfield banquet !).

Through the medium of MODEL AIRCRAFT and similar magazines, many a "character" in the model world becomes known by his somewhat bizarre dress. I suggest that it would be a mistake to try and change the free and easy attitude of most modellers, as a lot of the fun will be gone if we get too stuffy.

Yours sartorially,
BILL DEAN.
Weybridge Heath, Surrey.

Trikes for Team Racers

DEAR SIR,—Prangs in team racing are still far too frequent, and most seem to be due, directly or indirectly, to the undercarriage.

The design of a conventional two-wheel undercarriage is always a rather

(*Continued on page* 29)

Associate membership up

THE year just ended has been, on the whole, a satisfactory one for the S.M.A.E. Total membership of the Society is now 6,557 against 6,298 at the end of 1954—an increase of 259. The drop in full club membership from 2,720 to 1,917 continues the trend which was expected as a result of the introduction of the new membership scheme in 1953 and is counteracted by an increase in associate membership from 3,578 to 4,640.

In our opinion, however, the present total of less than 2,000 full club members should give the S.M.A.E. Council some cause for concern and we hope that the decrease in this important class of membership will not continue in 1956. We would be more complacent regarding this situation if a large majority of the 4,640 associate members could be considered as active model fliers—which are, after all, the life blood of the movement—but we must reluctantly admit that we feel that very many of them are merely S.M.A.E. insurance policy-holders. Maybe the local clubs can be further encouraged to bring all the associate members in their districts into the fold.

One disappointing aspect of the Society's activities was the surprising lack of interest in record attempts. In 1954, when we had very poor flying weather throughout the summer, 38 records claims were submitted to the S.M.A.E. for ratification. Last year when we had the best summer for very many years only *five* claims were received—and two of these were for indoor flying! The reintroduction of seven classes for C/L speed models should result in more claims being made in 1956, also the S.M.A.E. Records Officer has already drawn attention to the fact that at the present time nine of the 30 recognised international record classes are vacant; we hope that this will stimulate British fliers to endeavour to set up records for some of these categories.

Progress in propulsion

THE most significant change in full size aeroplane and engine design—jet propulsion—provided a challenge which modellers were not slow to meet. They evolved a number of systems that gave realistic simulation to jet flight, and just what these systems are, their advantages and drawbacks, will be discussed in a series of articles on "Jet Propulsion—and the Model," the first of which appears in this issue.

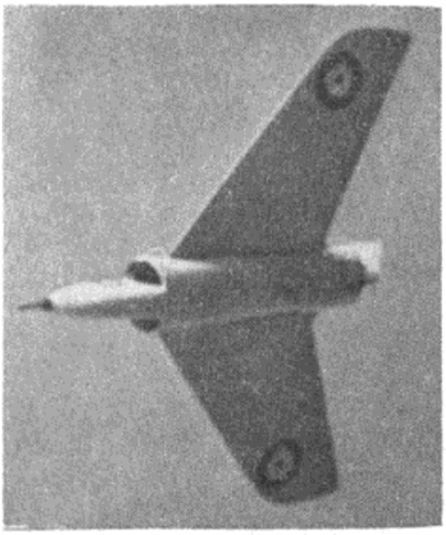
Among the systems to be dealt with will be the axial and centrifugal fans, and a well-known pioneer of the latter is John Coatsworth. Naturally he has also experimented with axial fans, and his latest efforts in this direction are shown in the photograph on the opposite page of his free lance design *Rapier*. This ducted fan model is finished in naval colours, and, although at present a little slow by centrifugal fan standards, is nevertheless a stable flier.

THE MAID AND THE MODEL

WITH the Vickers V.1000 now out of the running in the race to be first with a jet airliner that will cross the Atlantic non-stop, the only two possibles left are Boeing's 707 *Stratoliner* and the Douglas D.C.8. As we mentioned in our "Planes for Publicity" item last month, the British aircraft industry is making increasing use of models in sales campaigns, and the photograph below of a model 707 confirms that the Americans are no laggards at this publicity business either.

Obviously a lot of painstaking work has gone into this sectioned model, which is specifically designed to show possible seating arrangements of the new jet airliner; this particular version has seating for 108 passengers, five abreast. Beneath the passenger deck are large cargo and baggage holds.

Prior to "entering service" in Boeing's high-pressure sales campaign, the 8-ft. model was displayed at the Institute of Aeronautical Sciences in Seattle.



John Coatworths' "Rapier" airborne

Any Surplus Solids?

HANDLEY PAGE test pilot Jock Still has a couple of 10 in. span solid metal models of the *Canberra* to exchange. Completely perfect in every detail, both have well finished bases.

Jock would be interested in hearing from any reader who has a solid metal model of a *Hurricane*, *Meteor*, *Mosquito*, or *Hunter* for exchange with one or both of the *Canberras*.

Letters should be addressed to: J. W. Still, c/o this office.

Engine Quiz Result

THE engine quiz which we published in our December issue seems to have been rather more difficult that we imagined as no one achieved an all correct answer. However, we have awarded a consolation prize of a six month's free subscription to the three contestants who had 11 out of 12 right. They are: E. Smales of Hull, K. Procter of Sunderland and P. Bearne of Rochdale.

The two pictures which caused the greatest trouble were No. 3 (O.S. Max-1 0.29) and No. 7 (K. & B. Torpedo 0.19). Some readers identified the Max-1 as the 0.35 model; others failed to distinguish between the two and merely named the engine as an O.S. Max-1. The Torpedo 0.19 was, in a number of cases, given as the Torpedo 0.15.

The Max-1 0.29 can be distinguished from the 0.35 model, in our photograph, by the machined section around the front bearing. On the 0.35, this carries a deep groove; the 0.29, is quite plain.

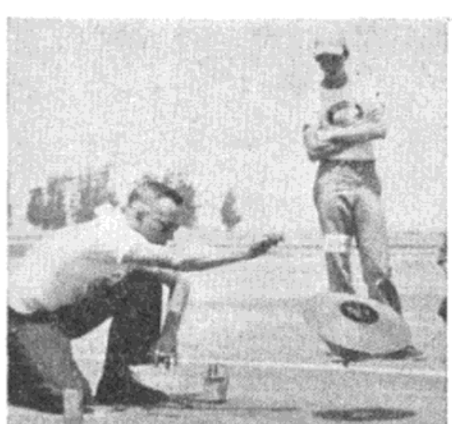
NEW RECORD

On Sunday, December 4th, Ray Gibbs (East London Club) broke the existing British record for Class I (2.5 c.c. speed models, and also the World record for the same class (subject to ratification). His speed was 198.9 km./h. (123.5 m.p.h.) and he was flying with the new longer line length. The model was Gibbs' own design and the engine a Carter "Nipper I." The attempt was specially arranged with the S.M.A.E. and held at Heston aerodrome.

In the case of the Torpedo 19, several features can be distinguished in the photograph which rule out the 0.15 model, i.e., six head screws are used instead of four, the cylinder cooling fins are fewer but thicker in section and the exhaust duct is narrower. The complete answers are: 1. Burgess M.5. 2. Allbon Dart Mk.1. 3. O.S. Max-1 0.29. 4. Eta "5" diesel. 5. Allyn Sea-Fury Outboard. 6. Sabre 0.19. 7. K. & B. Torpedo 0.19. 8. Taifun Hobby. 9. Metro 52. 10 Cox Thimbledrome 0.049. 11. Nordec R.10. 12. Amco BB 3.5.

Saucy Saucer!

MOST unusual sight at the Californian Model Plane Nationals this year was this flying saucer (or lampshade!) by a member of the Belleville Flying Dutchman Club. It climbed to several hundred feet in perfectly stable flight, flying by means of the ducted fan effect of the 0.049 glo-motor attached on a bar across the opening. Entered in the helicopter event, it was finally disqualified by officials as not complying with rules regarding "maximum allowable lifting surface in relation to swept area of rotors."



1956

About this time of the year periodicals have a habit of presenting their unsuspecting readers with a review of the past 12 months.

When this sort of article is printed in a magazine it means only one thing to us—that the reporting staff wanted to be home early for Christmas and knew an easy way to fill space. We do not propose, therefore, to publish a "Memories-of-1955-as-recalled-by-the-files-of-our-magazine" type of article. Instead, we thought it might be a pleasant change if we were to print now the details of the events we shall be reporting during the next 12 months.

So, with the aid of the crystal ball that we normally reserve for banging in pins, we have produced the following predictions for 1956:

January: *News that the 1956 World Championships might be held in Great Britain is welcomed. It means that—with an all-out effort—it might be possible to raise enough money to send a British team.*

February: *Epsom Downs Conservators pass a strongly-worded resolution deploring the use of the Downs by horses. One member declares: "They constitute a serious hazard to model aircraft, and it must be clearly understood by horse-owners that if the trouble persists we may consider taking appropriate action."*

March: *A strange report reaches the M.A. office. Apparently a boy of 12 walked into a model shop and said that he was a beginner looking for a first-ever model. Instead of wanting a diesel powered Messerschmitt 109 with scale tail surfaces and scale dihedral, he actually asked for a beginner's glider. The proprietor is still recovering from shock.*

April, May and June: *In rapid succession, Eric Fearnley wins trophies for team racing, rubber and power duration flying, and the Gold Trophy. His "Lemon Meringue Mk. VIII" canard design sets a vogue for microfilm wing ribs, spiders' web stringers, and spars made from folded D-sections of thinly-doped lightweight tissue.*

July and August: *Two months of just the kind of weather you would expect for July and August. (The crystal says nothing more than that.)*

September: *Someone realises that at least two months have gone by without an article or a book being published on "Your first solid model." This is immediately rectified.*

October: *Contest organisers are worried. So many people wanted to act as timekeepers at 1956 events that there was hardly anyone left to fly the models.*

November: *"How I get ideas for my column" is the subject of an address given by Pylonius at a meeting attended by flying scale enthusiasts, kit advertisers and C/L speed champions.*

December: *Small ad appears in Model Aircraft: "Wanted satirical columnist for model magazine; ju-jitsu essential."*

THE PIPER 135

TRI-PACER

AN ATTRACTIVE SCALE MODEL FOR POINT FIVE POWER

by A. Warren

FOR sports flying from small areas, the Piper Tri-Pacer is ideal, and it can be flown successfully and often with the minimum of checking and aligning. The prototype was test flown in a 15 m.p.h. wind and since then has never had a chance to show its capabilities in really calm weather. The Frog 50 provides ample power with a 6 × 4 in. prop.

Fuselage

Build a fuselage side over the plan, including the sheet fill-in at the tail, and then build the second side on top of the first. Separate carefully when dry, and then add formers F4 and F5 to make up the cabin box.

Fix securely while drying, and clip the fuselage ends together—do not cement ends together at this stage as the tailplane has to be inserted. Now the remaining rear fuselage spacers can be positioned, together with the small triangular top formers. When this stage is completed add $\frac{1}{4} \times \frac{1}{8}$ in. strips to the cabin roof edges.

Now make up the former F1 of ply, on which the ply engine bearer is mounted by means of a mortice and tenon joint. Before cementing, be sure to drill out the holes in the two pieces to take the undercarriage wire binding thread. Having firmly affixed the wire, the complete bearer and former can be cemented in position on the fuselage, and also F2 and F3. A $\frac{1}{8}$ in. square strip extends from F1 to F3 on the top of the fuselage.

Between F1 and F3 cover with bristol board or cartridge paper; this extends down to the $\frac{1}{8}$ in. sheeting as shown on the plan. This sheeting can also be added at this stage, remembering to fix in place the press studs for the V struts.

The undercarriage is from 16 S.W.G. wire securely bound on $\frac{1}{8}$ in. ply, sized to fit neatly into the underside of the fuselage. Also on the ply is the wing retaining hook. The $1\frac{1}{2}$ in. dia. wheels are added, with cup washers. The complete unit should not be cemented to the fuselage until the model is completed, as it can then be positioned to locate the c.g. correctly.

Tail Unit

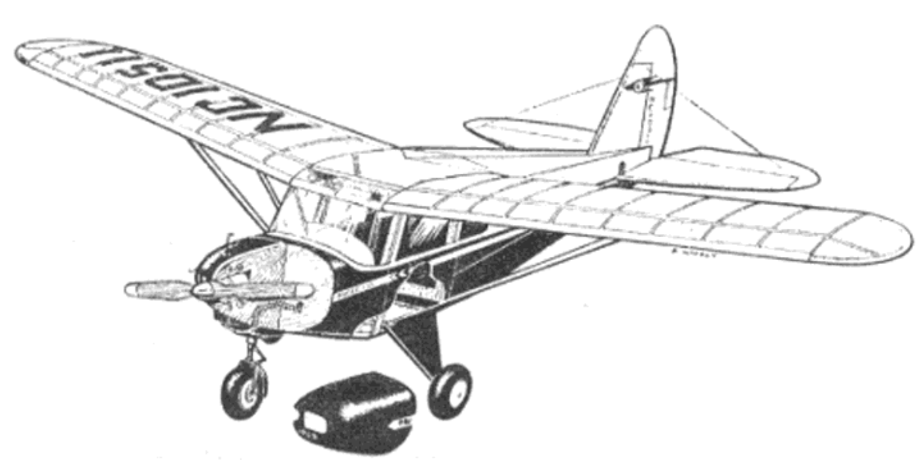
The fin is shaped from $\frac{1}{8}$ in. medium balsa and cemented to the fuselage; a small trim tab is fitted by means of an aluminium hinge. The tailplane is shaped from $\frac{1}{8}$ in. balsa and divided—two $\frac{1}{8}$ in. dowels being fixed into each unit. Adjustment for a negative or positive movement is by means of a 6 B.A. screw bolt as shown in the diagram on the plan.

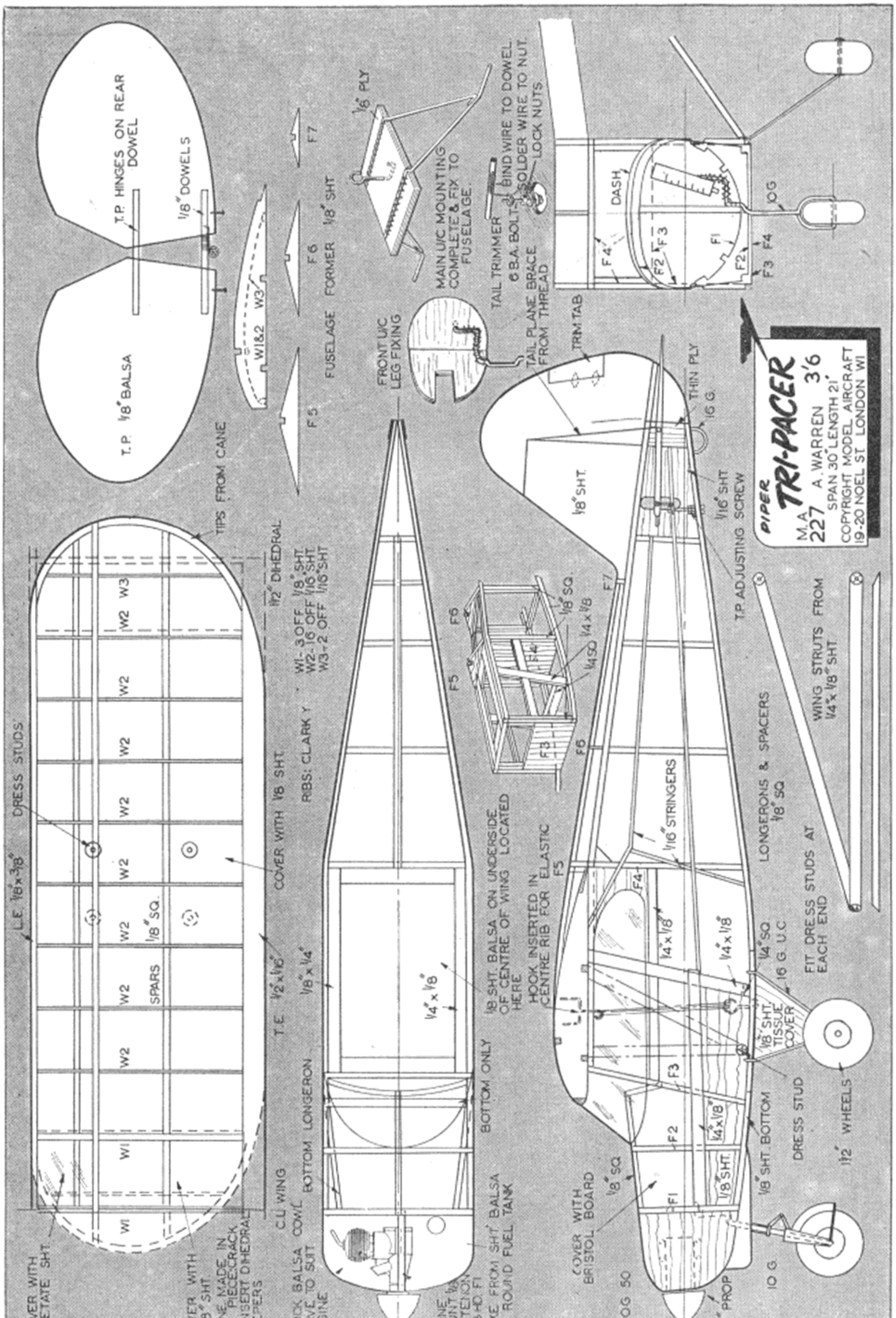
The remaining details can be added to the fuselage such as the windscreen, dashboard, cabin outline and so on.

Wings

The wing is built up in one piece then cracked, and the dihedral braces added. Cover the underside of the centre section with $\frac{1}{8}$ in. sheet so that it fits neatly into the top of the cabin, and add the fuselage attachment hook. Two of the outer wing panels are also covered with $\frac{1}{8}$ in. sheet as shown, to take the stud fasteners which retain the V struts.

Cover the complete model with lightweight Modelspan and give two coats of clear dope. The Tri-pacer can be finished in a variety of attractive two-tone colour schemes including yellow/maroon, dark green/apple green, or blue/yellow.





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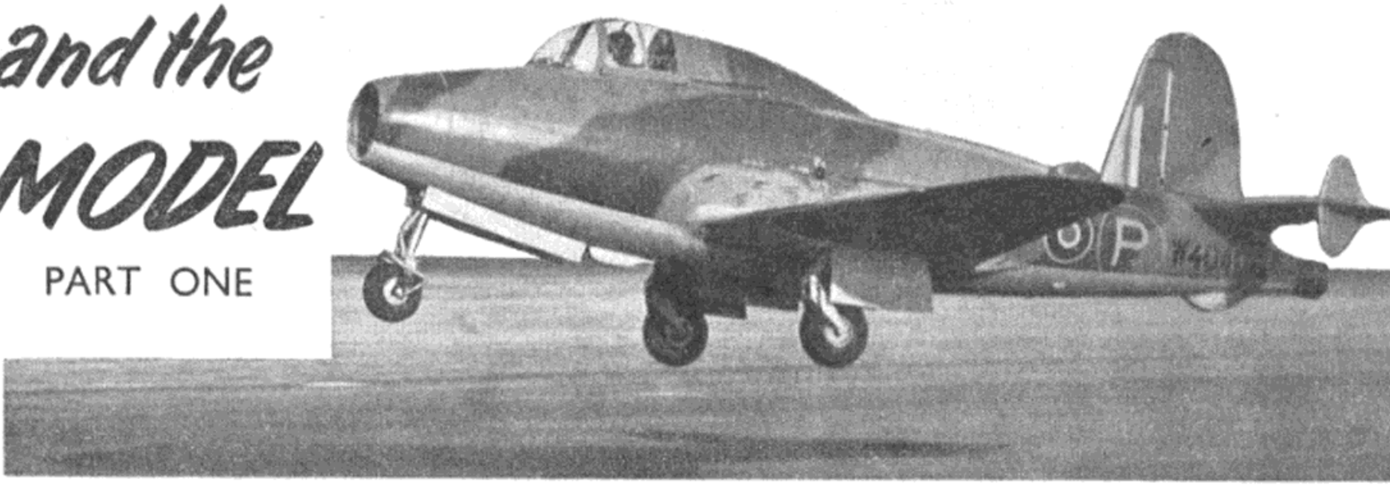
JET PROPULSION—and the MODEL

PART ONE

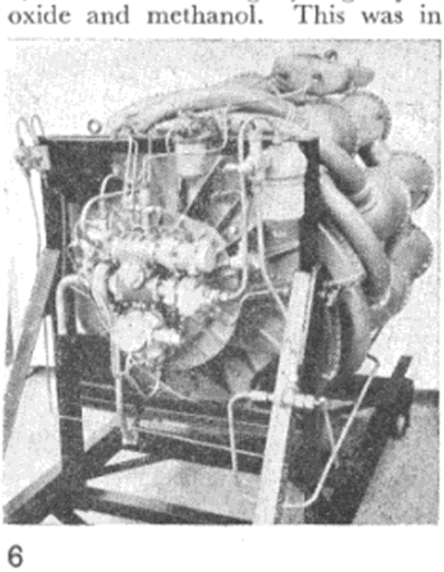


Gt. Britain's first jet aircraft, the Gloster E.28/39. Two prototypes were built, powered by various experimental engines. The second machine eventually attained 466 m.p.h. powered by a W.2B. of 1,526 lb. thrust.

Developments in model jet engines have been comparatively sparse. Today the only widely used forms of model jet propulsion are the solid fuel rocket engines, as exemplified by the Jetex units and the ducted fan. The pulse-jet unit, which has been available in model form for about ten years, is very restricted in application—a "one size" model in commercial form—and banned for all but C/L models in this country. Yet there have been experimenters who have delved into the mysteries of scale ram-jets, gas turbines and the like. And plenty more who have wondered *why* there have been few model developments in such fields.

We feel, therefore, that a general survey of the "jet power" field for models is timely. But to start right it is first essential to get a clear idea of the basic operating principles and types of engines which come under the heading of "jets," to which end this first article of the series is devoted. Following articles will then discuss in detail model possibilities—and progress, where it can be reported—in all these different types.

As a matter of history, the first aeroplane to fly successfully powered by a "jet" was the German Opel/Hatry glider fitted with a Sanders rocket motor. It flew in 1929 and reached a height of 50 ft. One of the first really successful German jets was the Heinkel He 176, which employed a rocket motor of 1,100 lb. thrust using hydrogen peroxide and methanol. This was in June 1939, and in August the Heinkel He 178 made its first flight, powered by a Heinkel-Hirth HeS 3B turbojet, thus becoming the world's first practical jet aeroplane.



The original Whittle jet engine—a compact, rugged unit of the centrifugal compressor type, the basic working principles of which are shown in Fig. 1.

A year later, Italy made her contribution to the history of jet aircraft with the Caproni-Campini N.1 (also known as the C.C.2), utilising a piston engine to drive a ducted fan with afterburner. This system was only partially successful and modifications were made. In its later form it made a 168 mile flight in November 1941, at an average speed of 130 m.p.h.

However, this latter flight was preceded by the British Gloster E.28/39, which first flew in May 1941, powered by the Whittle W.1 engine of 850 lb. thrust.

In the light of experience, development was concentrated on the turbojet rather than the rocket motor, at least until the latter part of World War II, when a number of different *types* of jet engines—such as pulse units and ram jets—made an appearance. Of recent years, also, the rocket motor has again come into prominence, both for jet-assisted take-offs and for "boost" power for short bursts of high speed flight. Rocket power has been the basic engine of many of the American "X" series of supersonic research aircraft which have recorded speeds of up to Mach 2. But the limited duration feature of such rocket engines still remains. That used in the X-1, for example, had a maximum duration of 4 min. only.

It will be noticed that we have called the rocket motor an "engine," which is strictly true by definition of that term. Thus a "jet engine" may be rocket or pure jet, by-pass or true ducted fan, compressor-type or axial flow, ram jet or pulse jet, compound or turbo-prop—and quite a number of other names, some justified, some fallacious, which have been further introduced in the meantime.

Primarily this is intended to be an article on model jets—or jet engines for models—but the full size angle is necessary for a beginning in order to classify the various types of jet engines and clarify their working principles. Some lend themselves to production in model form, some

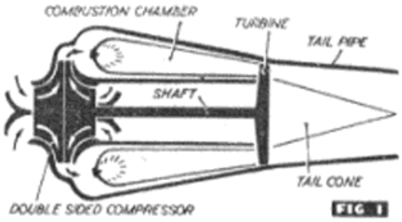


FIG 1

do not. But the modeller is always ambitious and it is probably true to say that attempts have been made to duplicate all the "full size" jet engine types and certain successes have been achieved outside the currently available forms of model jet propulsion, as exemplified by the solid fuel rocket motor (Jetex), the pulse jet (Dynajet) and the pure ducted fan. It is proposed to discuss all types in some detail, together with their particular limitations for model work.

The original Whittle jet engine was of the centrifugal compressor type, employing a double sided compressor mounted in a plenum or pressure chamber—Fig. 1. This arrangement produces quite a compact, rugged unit—short and relatively fat—and not too difficult to make in "full scale" sizes. The impeller is essentially a development of the centrifugal supercharger and compresses the air by centrifugal force—by throwing it outwards at high speeds. Diameter requires to be fairly large for satisfactory results and to reduce it Whittle decided upon a double-sided compressor. The degree of compression available from such a layout ranges up to about 5 : 1 and the double-sided centrifugal compressor type of pure jet engine has been continued in such designs as the Rolls Royce Derwent and Nene, etc.

Essentially the same layout, but with a single-sided impeller, is used in the de Havilland Goblin and Ghost—Fig. 2. Compression ratio is limited to a maximum of about 4.5 : 1 with such a design but the efficiency is helped to some extent by the forward-facing air intake producing a "ram" effect. Both are essentially pure-jet engines, and as the diagrams show, the compressed air is fed into a number of combustion

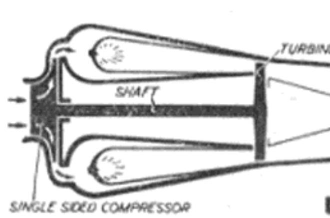


FIG 2

chambers located around the periphery of the engine. Fuel is injected into each combustion chamber and ignited, the expanding, burning gases escaping downstream past the blades of a turbine rotor before entering the tail pipe proper. (And, once lighted, the burning will continue until the fuel supply is shut off.)

The turbine is thus driven round at high speed by the escaping gases. The turbine wheel is connected to the compressor by means of a shaft and thus drives the compressor. Some of the energy of the gases is used up in this way, the remainder is availa ble in the form of thrust.

The other main type of pure-jet engine follows the same operating principles but utilises a different type of compressor, known as an axial compressor. This, essentially, con-

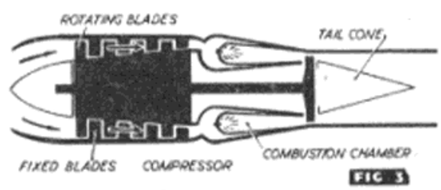


FIG 3

sists of a series of multi-bladed fans rotating in an annular duct, the cross section of the duct decreasing from front to rear and each fan separated by a similar series of fixed fan shapes, called stators (i.e. fixed blades arranged in fan form)—Fig. 3. The number of stages can be added to to produce the required degree of compression, or two separate axial compressors used, each driven by its own turbine, as in the so-called two-spool or split-compressor type of axial unit shown in Fig. 4. With axial-flow units, compression ratios of up to 10 : 1 are commonly realised.

As regards full scale application, it is commonly held that the axial-flow type is capable of development to much higher power outputs and greater fuel economy. On the face of it, too, it would appear to be the more logical type from the point of view of the airflow being "straight through." But against this is the inevitably greater length (although diameter can be reduced) and the fact that it is far more sensitive to operating conditions and critical as regards blade stressing. Hence it is rather more difficult to make and can also be subject to unstable flow conditions, such as uncontrolled surging.

Either of these two basic types lend themselves readily to getting more power still out of the engine (at the expense of greatly increased fuel consumption) by injecting raw fuel into the tail pipe—Fig. 5. This ignites and burns with the unburnt air still present in the normal jet exhaust and can give an increase in thrust of as much as 50 per cent. although strictly speaking the optimum effect is decided by the size of the tail pipe. To get maximum after-burner effect it is generally necessary to increase the area of the tail pipe somewhat, which may reduce the effective thrust of the engine without afterburner. The device is known generally (in this country, at least) as *after-burner*, although the term *reheat* is also used to describe exactly the same thing.

The method of driving the com-

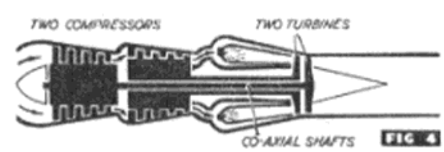
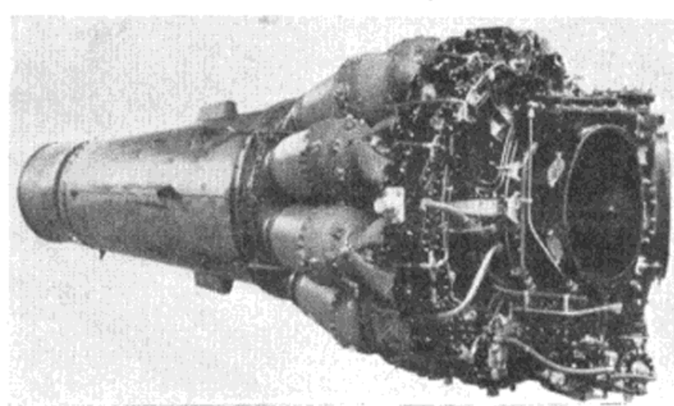
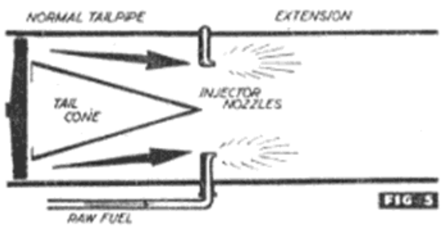


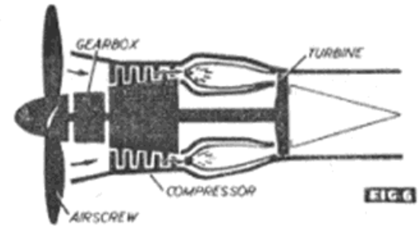
FIG 4

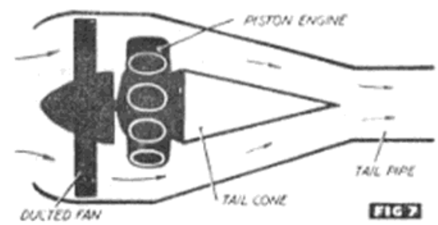
pressor by locating a turbine in the jet stream is obviously an efficient one and is carried still further in the turbo-prop. unit by extending the drive forward past the compressor and thence through suitable reduction gearing to a conventional airscrew—Fig. 6. This will obviously consume a much greater proportion



The de Havilland Ghost 48 Mk. I of 4,850 lb. thrust, which powers the "Venom" fighter. The Ghost has ten combustion chambers each fed by a twin diffuser duct from the compressor casing.







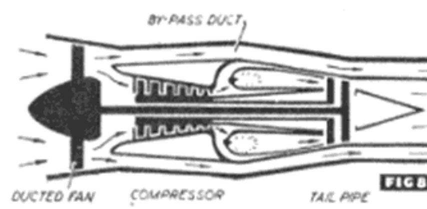
of "jet" power than driving the compressor along and so the available jet thrust is now quite low. The bulk of the thrust is derived from the airscrew. Both centrifugal and axial-flow compressor engines may be adapted in this fashion, e.g. Rolls Royce Dart and Armstrong Siddely Mamba, respectively; and also the airscrew shaft and the compressor shaft may be separate and driven by different turbine rotors, as in the Bristol Proteus. The prop-jet has certain advantages over piston-engine types, not the least being smoothness and quietness of operation, and also a considerable saving in weight for the same power output.

In basic principle, the turbo-prop. arrangement is not very different from using a piston engine to drive the propeller, locating the engine in a normal cowling with through flow and ejecting the engine exhaust through a suitable tail pipe, which is fairly common practice. Thus the two are directly comparable.

It is then only another simple step to replace the conventional airscrew with a multi-bladed type of fan in order to reduce the diameter and enclose the whole within a ducted nacelle—Fig. 7. The engine can be of the piston-type or turbo-jet (prop-jet). Thus the Caproni-Campini N.1 (C.C-2) used a piston engine with this form of ducted fan propulsion, whereas the principle of the modern by-pass jet engine (modern in appearance, although Whittle first suggested the arrangement in 1936) is identical, as exemplified by the Rolls Royce Conway and Turbomeca Aspin.

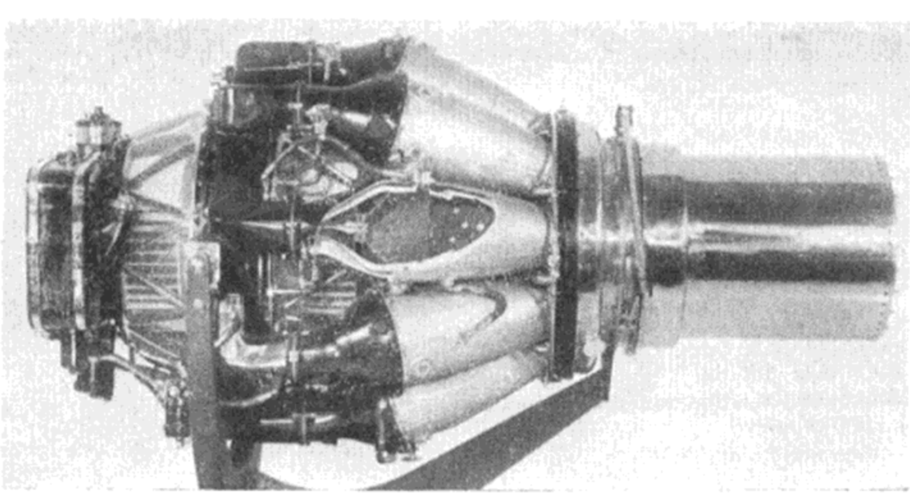
The by-pass jet engine is drawn separately in Fig. 8 where it is seen that part of the power is provided by pure jet thrust and part by the ducted fan slipstream by-passing the rest of the engine. Specific advantages are improved power for take off, greater flexibility as regards control and especially with regard to saving in fuel consumption at moderate cruising speeds. Jet thrust will predominate at the upper end of the thrust range and so in this respect the arrangement is different from the basic ducted fan driven by a piston engine where the "jet" thrust may be small to the point of being negligible. For the sake of clarity, therefore, although both types of engine are commonly grouped as by-pass or ducted fan engines, the piston-driven ducted fan is best referred to as the ducted fan layout and the turbine-driven ducted fan a by-pass jet engine. Then the by-pass engine can be considered to consist of a low pressure compressor (the fan) and a high pressure compressor (supplying the combustion chambers), both turbine driven.

Returning for a moment to the after-burner, here we get an appreciable thrust merely by injecting fuel into a fast moving air stream and letting it burn. Given such an airstream, it would, therefore, seem possible to be able to get thrust from a unit dispensing with everything in front of the afterburner,



i.e. merely a pipe. This, in fact, does work out in practice and is the principle of the ram-jet—Fig. 10, so called because the necessary high speed airstream is produced by the "ram" air forced into the pipe by a high flight speed. The system, in other words, relies on a high initial speed before it can work, which is a major difficulty in its application. The most direct solution is to use some other form of power to build up the required speed and then cut in the ram jet, when the engine becomes one of the most efficient of the prime movers since the only internal power losses are by gas friction, as there being no moving parts whatsoever!

The shapes shown in Fig. 9 are not parallel pipes, and are also quite different in form—one (the fat one) being a relatively low speed design (sustaining ignition at speeds in excess of 200 m.p.h.) and the other a supersonic ram-jet form. In the case of the low speed ram-jet, the air is slowed up on entering by expanding into a larger area and, losing velocity, produces an increase in the pressure. The fuel nozzles immediately follow the expansion chamber whence the tail section is proportioned, venturi fashion, for



A Rolls-Royce Derwent centrifugal flow turbo-jet showing a sectioned combustion chamber. There are nine chambers altogether, interconnected to equalise pressure and ignite the fuel in adjoining tubes when starting up. The turbine is of the single-stage axial-flow type with 54 blades. At the front of the engine are the fuel and oil pumps, and also an electric starting motor.

FIG 9

optimum coversion of heat energy of the fuel into velocity. At low speeds, however, even though ignition may be maintained the thermal efficiency will be quite low because of the relatively low compression ratios which can be achieved.

At supersonic speeds the entry can be proportioned so that the shock wave from the entry rim (and possibly an entry cone) will appreciably increase the compression ratio up to figures as high as 6 : 1 (or even 8 : 1 at Mach 2). Hence the resulting thrust can be considerable—and directly comparable with that of the turbo-jet engines, without their complexity and higher weight. An additional advantage is that the ram-jet, although an air-breather, could continue to work at much higher altitudes than turbo-jet engines since the latter are limited to a far greater extent by falling air density in that the compressor blades must eventually stall. In general, however, ram-jets are relatively inefficient at sub-sonic speeds because of the low compression ratios produced and, therefore, have to be quite large for producing a given thrust.

The pulse-jet is quite a different proposition, and works on an entirely different principle. It has a definite working cycle of operations, as opposed to continuous operation, and in this respect is more akin to a piston-engine although the only moving parts are the valves.

In its basic form, the pulse-jet consists of a suitably ducted entry (normally with expansion again to produce an increase in pressure, although not invariably so) opening on to a grid of ports or openings, each port being covered by a reed valve or spring-loaded flap—Fig. 10. An initial airstream is necessary again for starting, but the pressure need not be high, which before reaching the ports meets with a spray of ejected fuel (or sucks up fuel in the same manner as the spray bar on a model engine works). The fuel/air mixture striking the flap valves blows them open and enters the combustion chamber, where it is fired by a conventional spark plug. (Alternatively the fuel can be injected into the airstream *after* passing through the ports: the overall effect is the same.) The resulting explosion closes the flap valves, so that the only escape for the expanding gases is down the tail pipe. By properly proportioning the combustion chamber and tail pipe areas and volumes, this results in a *reduction* in pressure in the combustion chamber to assist the airstream in opening the flap valves to admit a new charge and so continuously repeating the cycle. Residual heat in the combustion chamber is enough to ignite the fresh charge and so the spark ignition can be disconnected once the engine is running.

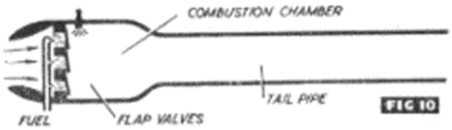
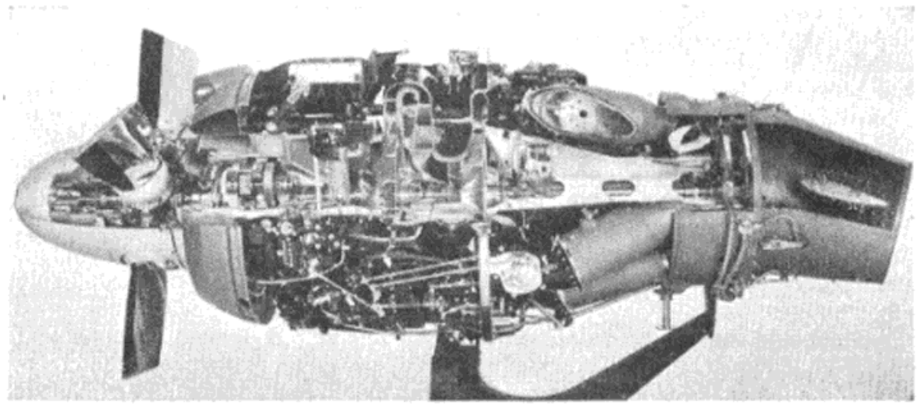


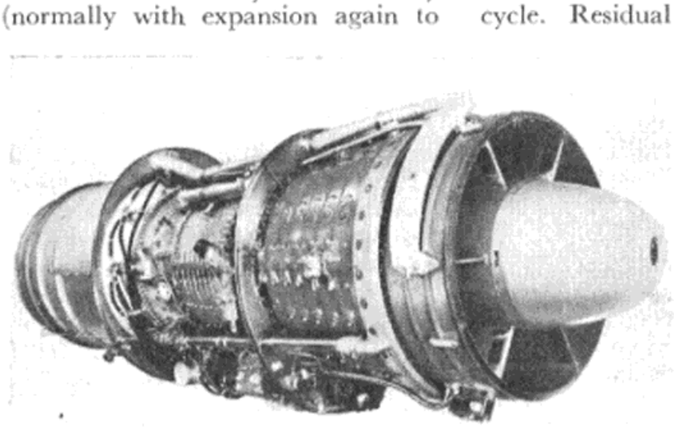
FIG 10

The simple cycle, in large pulse-jet units, is repeated with a frequency of about 50 cycles per sec. but smaller units invariably have to be operated at a much higher rate. In contrast to the ram-jet, the pulse-jet is relatively efficient at low speeds, but it is not a constant thrust unit in that it tends to lose thrust with increasing speed. This, largely, is due to the fact that there is a certain reversal of flow in the tail pipe during a complete cycle (even to the extent of an inflow into the tail pipe during part of the cycle). From the point of view of practical application the life of the valves is generally limited.



A sectioned view of the Rolls-Royce Dart turbo-prop. The airscrew hub contains the pitch-changing mechanism, behind which is the reduction gear. The centrifugal impellers each have 19 vanes, and they pass nearly a ton of air each minute. At the rear can be seen the straight-flow combustion chambers, which feed the two-stage turbine.

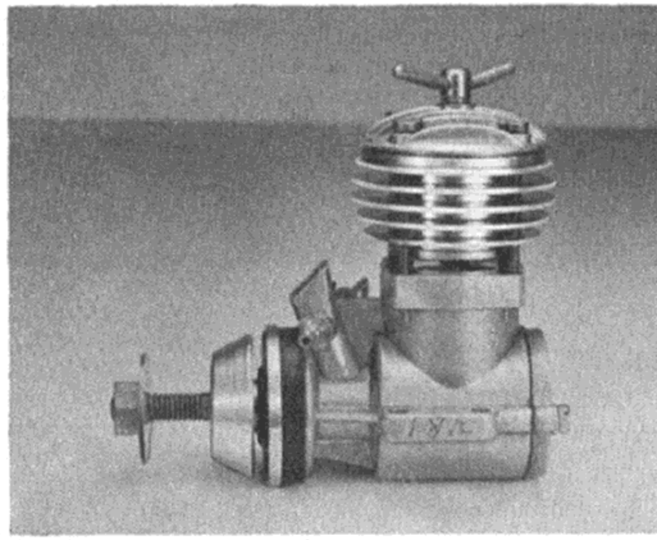
The only other type of jet engine remaining to be classified is the rocket, which exists in two main forms—the solid fuel rocket and the liquid fuel rocket. Both are essentially similar, the difference being that in the one case the fuel and oxidiser are in liquid form and contained separately, brought together in a combustion chamber; and in the other the charge is solid, ignited and burnt in a similar fashion to a firework rocket. Whilst the latter may appear more convenient, much greater power is available from separate mixtures too unstable to bring together except for firing, and also this arrangement is more controllable.



A powerful example of the two-spool type of turbo-jet, the Bristol Olympus of 11,000 lb. thrust. From this photograph can be seen the positions of the two axial compressors. (See Fig. 4.)

Engine Tests

No. 81. The Frog 249 B.B.

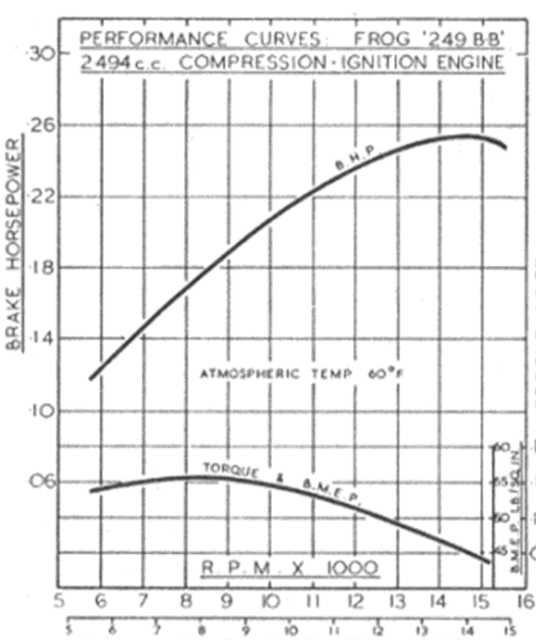


FOR some time it has been known that the International Model Aircraft model engine division of Messrs. Lines Bros. Ltd., under the direction of Mr. George Fletcher, have been working on two new diesels to replace existing models in their range. The first of these, the 249 B.B. model, is now in production and was available on the home market from the middle of December. The initial production batches have already been sent to Australia, where Frog engines have always enjoyed good sales, and the new model should, therefore, be available simultaneously in both countries.

Nowadays, model engines from different manufacturers are somewhat prone to follow stereotyped patterns of design and, from a brief description: "shaft-valve, radial-port, beam-mount diesel," we might be forgiven for supposing that the new Frog would be just another engine to a familiar layout. On first sight of the new Frog, however, one is pleasantly surprised to note some originality in its external appearance and this favourable impression is maintained on further examination and test of the motor.

Externally, there is very little to identify the 249 B.B. with any previous Frog engine or, for that matter, with any unit of any other make. The cylinder barrel is noticeably larger than normal, with very deep cooling fins. A second obvious and most unusual feature is the rectangular shaped intake. Thirdly, the front end of the engine is of quite unique appearance by reason of a synthetic rubber oil seal which covers the entire front bearing housing and is retained by a brass ring.

This latter feature is an excellent idea and is one which might be adopted more generally on ball bearing type engines, offering, as it does, protection against damage by virtually eliminating the possibility of any dirt entering the bearing.



Other features of the engine are the forward positioning of the mounting lugs to reduce overhang, the inclined needle valve assembly and the tapered airscrew drive collet.

Internally, the 249 B.B. shows marked departures from previous Frog practice and, in this respect, differs from the Frog 250 model, which it replaces, just as much as in appearance. The cylinder liner employs four radial exhaust ports of relatively moderate area. Between them and steeply inclined to speed the gas flow to the combustion chamber are four circular transfer ports. The liner is flanged at the exhaust belt and fits into a shallow annular seating in the top of the crankcase, thus leaving a 360-deg. transfer passage between the outer wall on the liner and the inner wall of the crankcase. This arrangement is similar to that used in one or two specialised racing diesels and is a layout which lends itself to a certain amount of modification and tuning for extra high performance.

The crankshaft is of a counterbalanced pattern and, of course, is supported in two ball journal bearings. Noteworthy is the extra robust connecting rod and generous diameter crankpin and gudgeon pin. The short-skirted piston has a bevelled crown to which the contra piston is suitably matched.

Specification

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

Swept Volume: 2.494 c.c. (0.152 cu. in.).

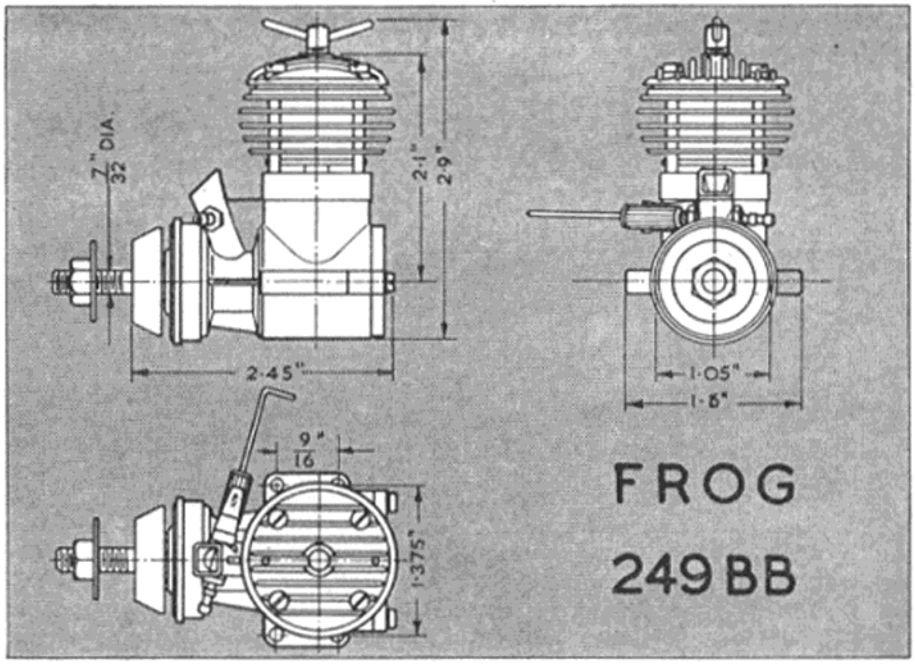
Bore: 0.581 in. Stroke: 0.574 in.

Stroke/Bore Ratio: 0.988 : 1.

Weight: 5.8 oz.

General Structural Data

Pressure-diecast LAC.112A alloy crankcase with integral main bearing housing and mounting lugs. Three per cent. nickel-steel counterbalanced crankshaft, hardened, ground and heat-treated and running in two ball journal bearings. Front bearing enclosed by synthetic rubber oil seal. Cylinder of close-grain mild steel, hardened, ground and honed. Piston and contra piston of Brico cast iron. Connecting-rod forged from R.R.56 alloy. Full-floating gudgeon-pin of silver steel. Machined aluminium alloy finned cylinder barrel, sliding fit over liner. Diecast aluminium alloy cylinder head. Entire cylinder assembly secured to crankcase with four long machine screws. Beam type mounting lugs. Spraybar needle-valve assembly.



Test Engine Data

Running time prior to test: 2 hours.

Fuel used: 40 per cent. technical ether BSS.579, 30 per cent. Shell Royal Standard kerosene, 30 per cent. Duckham's racing castor oil, plus 2-4 per cent. amyl-nitrate.

Performance

The Frog 249 B.B. is quite the most well-mannered diesel that we have encountered for a long time. Starting is exceptional. Without actually making a time check, we had the engine started within a matter of seconds. This required no priming: we merely choked the intake for three or four flicks and, after two or three more flicks to get the feel of the required compression setting, we had the engine running steadily.

The unusual appearance of the 249 B.B. is matched by some unusual operating characteristics. Even on small propellers allowing speeds of 15,000 r.p.m., it remains quite docile and has no tendency to snap around and "bite" the fingers like most other diesels. It is more like a glow-plug engine in this respect. The engine is also remarkably smooth running. We picked up a brief vibratory period in the region of 9,100 r.p.m., but this was not severe and at all other normal operating speeds, the 249 B.B. is smoother than most other diesels of similar size. At twice this vibration frequency (i.e. about 18,000 r.p.m.) the effects are apt to be somewhat more severe and, from information since obtained from the makers, we would suggest that such very high speeds are best avoided. The 249 B.B. has actually been run up to 23,000 r.p.m. but, in any case, such speeds are well outside normal operational requirements.

The engine delivered its best torque at about 8,500 r.p.m., where the equivalent b.m.e.p. reached was over 55 lb./sq. in., a very good figure. The decline in torque was more gradual than is usual, with the result that the maximum output was reached at relatively high speed—almost 15,000 r.p.m. This figure may, at first sight, appear improbable having regard to the relatively modest exhaust port area: it is made possible by an exceptionally long exhaust period (over 170 deg. of crank-angle as compared with a normal maximum of 140 deg.) and the efficient transfer porting. The actual b.h.p. recorded was fractionally under 0.26, an above average figure which is some 60 per cent. better than the M.A. test figure for the previous 250 Frog model.

Control response was entirely satisfactory. The needle valve is positive and the angled control stem is effective in preventing minced fingers. The contra piston fit was good and there was no tendency for the contra piston to seize when hot, yet, at the same time, there was a negligible leakage of oil into the head.

For operation at moderate speeds, the engine will run satisfactorily on various proprietary fuels, but, at five figure speeds, the deficiencies of most commercial blends become increasingly evident as higher speeds are aimed at. The 249 B.B. definitely requires a quite heavily nitrated fuel and at least 3 per cent., but preferably 4 per cent., of amyl-nitrate is required in the fuel for speeds approaching the peak of the power curve. Merely increasing compression is no longer effective at these speeds.

To sum up, this is a worthy addition to the 2.5 c.c. ranks, which is unusually successful in combining pleasant handling characteristics with high performance. It should prove popular.

Power/Weight Ratio: 0.71 b.h.p./lb.
Specific Output: 102 b.h.p./litre.

Engine Materials—5

Hard Brass. The hardness of cold rolled brass sheet, strip and shim stock is classified according to the amount of working (i.e., thickness reduction) it has received during rolling. Thus, grading may range from quarter-hard (soft) brass to half-hard, hard and extra-hard. Spring brass is obtained by still further reduction in thickness.

Meehanite. A cast-iron which has been "innoculated" with calcium silicide, while in the molten state, immediately prior to casting. This produces a fine graphitic structure and a material of improved mechanical properties. It is widely used in model engines for pistons and cylinders.

Molybdenum. Molybdenum is sometimes used in alloy steels employed for model engine crankshafts, etc., e.g. nickel-chromium-molybdenum steel. Such steels have good fatigue resistance and hard wearing properties. Similarly, molybdenum-iron cylinder liners are to be found on some racing engines (e.g. Dooling 61) the molybdenum in this case serving to increase strength and resistance to heat.

Nickel Steels and Nickel-Chromium Steels. These alloy steels, with or without the further addition of molybdenum, tungsten vanadium, etc., are widely employed in model engine construction for crankshafts and, to a lesser extent, for cylinders and cylinder-liners. Such steels are tough and hard, offering resistance to shock with good wearing properties.

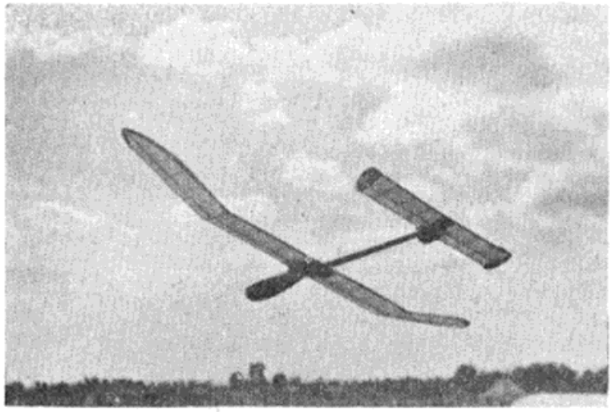
Nitralloy Steel. Nitralloy steel may be used for cylinders and cylinder liners (e.g. Mills engines) and is the term applied to alloy steels which are surface hardened by impregnation with nitrogen, the process being known as nitriding.

Phosphor-Bronze. Phosphor-bronze is frequently used for main bearings, connecting-rod bushings, etc., where hard wearing properties are required. Phosphor-bronzes of this type are alloys of tin and copper with up to 1.5 per cent. phosphorus.

Platinum-Iridium. Platinum-iridium alloy is employed for the wire filaments on the majority of glowplugs. Iridium, a very hard metal, is employed to strengthen the soft platinum.

TAILPLANE AREA—
and the A.2

by J. Van Hattum



FEW types of models have been influenced by modern design trends to the same extent as the Nordic sailplane. Within a couple of years a quite different layout has appeared and much careful thought and painstaking experiment have gone into the development of new and radical designs.

The outstanding performance of the top class of Nordics has shown that much of this research has paid off well, but in the writer's opinion we are by no means at the end of this interesting stage of development. One of the recent and notable trends in design can be seen in the relative proportions of wing and tail areas, which have departed a long way from the generally accepted practice of a few years ago. In those days a tailplane area of 25 to 30 per cent. of the wing area was quite a normal design feature and with it one used a relatively short moment arm between the centre of gravity and the mid-chord of the tailplane.

In recent years, however, the tailplane area has been considerably reduced, reaching in some cases not more than 12 to 15 per cent. of the wing area. The argument which supports this choice would, at first sight, appear to be quite sound. Since the total area of the Nordic is given in the specification, it would seem logical to try to use the greatest possible area in the wing itself, the tailplane being, on account of its small size and resulting inefficiency, a poor lift-producer. The larger the wing, the lower the wing-loading and the lower the forward flying speed. From this will follow a lower sinking speed, the all important factor in obtaining long duration.

It now remains to find out how great the gain is with the reduction of sinking speed, and the greater resultant duration, by the reduction of the tailplane area and enlargement of the wing-area. In order to do that we must first refresh our memory with a few simple facts.

(*a*) The forward speed at which the model flies is directly proportional to the root of the wing-loading.

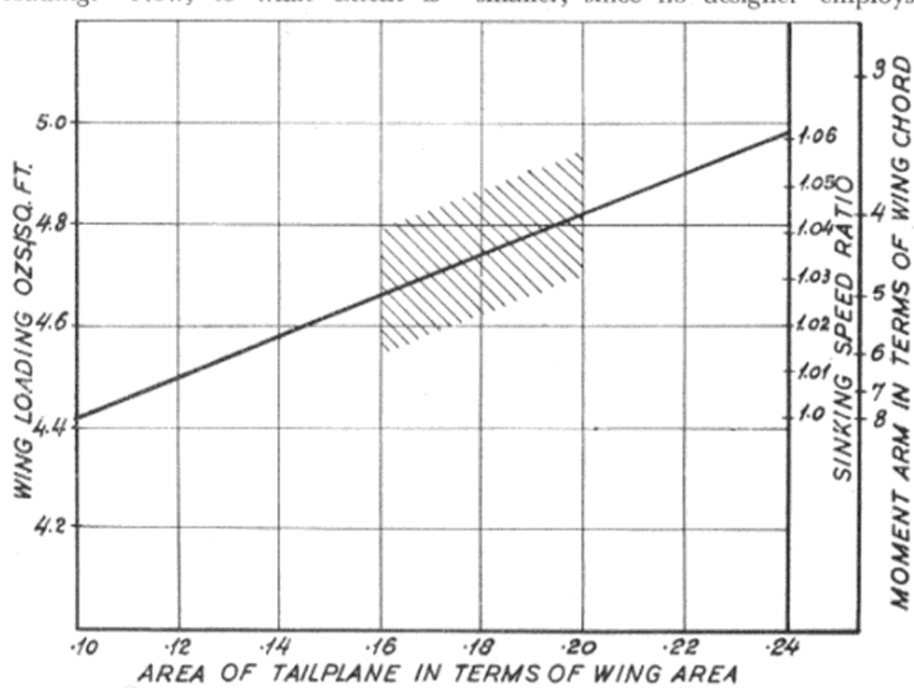
(*b*) The sinking speed of the model is directly proportional to the flying speed and inversely proportional to the aerodynamic quality of the model. (We are at the moment only interested in the first factor as we assume that the aerodynamic quality remains constant in all cases.)

From (*a*) and (*b*) we may now conclude that the sinking speed is directly proportional to the wing-loading. Now, to what extent is the wing-loading (and therefore the sinking speed) influenced by a reduction in the area of the tailplane? The table tells us quite a lot about this. We see in column I the area of the tailplane, expressed in terms of the wing-area; in column II the actual wing-area corresponding to column I, and in column III the wing-loading corresponding to I and II and based on a total weight of 14.5 oz. One can see that the wing-loading is not considerably reduced by employing an extremely small tailplane.

When we work out the root of the wing-loading from column III, we see that the actual improvement in sinking-speed is quite small. Taking a tailplane area of only 10 per cent. of the wing-area, which is less than that of any model we have seen, and comparing this with a quite large area of 20 per cent., we see that the ratio of sinking speeds become:

$$\frac{V_s \text{ for } 20\%}{V_s \text{ for } 10\%} = \sqrt{\frac{4.82}{4.42}} = \sqrt{1.091} = 1.045.$$

In other words: the sinking speed will be increased by 4.5 per cent. when we substitute a 20 per cent. tailplane for a 10 per cent. tailplane, with a corresponding decrease in wing area. Now, a 4.5 per cent. reduction in performance is not of such magnitude that it would be a cause for complaint. If we take 120 sec. as a good average duration, the maximum "loss" that could be expected would be about 5 sec. Actually the loss is much smaller, since no designer employs



Graph showing the relationship between tailplane area, wing-loading, sinking-speed and tail moment arm. The shaded area indicates the average limits of the tailplane area.

L.S.A.R.A.
Conference Report

NOTABLE for the wide variety of subjects discussed, the second Model Aeronautics Conference was held in the R.Ae.S. Library, on Saturday, November 12th, 1955. This annual event, organised by L.S.A.R.A., can be guaranteed to provide food for thought for all forward thinking aero-modellers. Modellers who are frightened away by the prospects of mathematical technicalities can take reassurance from the fact that mathematics, when present, is relegated to the Appendix of a paper.

This year's conference commenced with a talk by Mr. Kerr of R.A.E. on the use of dynamically similar models for spinning and accident investigation. There being some doubt about the validity of wind tunnel spinning tests the *Javelin* was tested in F/F to prove the recovery technique, which incidentlly, requires applying aileron into the spin. Films showed the 10-ft. span, 200 lb. model, dropped from a Cardington balloon at 3,500ft., spinning, flicking into an aileron turn, then recovering into a straight pull-out, and the parachute opening. Controls were operated in sequence by a clockwork-driven potentiometer circuit and L.S.A.R.A. servos.

The other film featured the *Comet* accident investigation. Models to 1/36 scale catapulted into a net from the top of the 160 ft. high airship hangar, showed how close the wreckage could fall after a mid-air breakup. Other models showed the spin resulting from a missing wing-tip. Projected at " full scale " speed these films were very convincing.

The second lecture, by Mr. B. S. Shenstone of B.E.A., discussed the very light highly efficient aeroplane—or, to be more specific, the man-carrying aircraft which will fly with the least power. In 1903, man could fly on 12 h.p., but Mr. Shenstone showed that as little as 0.68 h.p. was necessary with modern knowledge, although this requires the very smooth surfaces necessary for laminar flow. For such an aircraft light weight is important, and it was considered that model techniques would be useful, for instance, using balsa sandwich construction. For adequate power, perhaps ten 0.3 b.h.p. diesels? For the hard-up pilot with a strong and willing friend there is no need for any engine; a pilot using his feet and the passenger using both hands and feet, provide ample energy for flight. We fear that such an aircraft would have to be kept well clear of downdraughts and large gusts. All the same, well worth building.

Opening the afternoon session, " Aerodynamics of the Zanonia Macrocarpa " by Dr. A. Raspet showed that when it comes to deciding who flew the first stable tailless, Dunne was beaten by a Javanese cucumber! This seed is able to travel 700 ft. in the course of a glide from 125 ft.!

A paper on the measurement of the aerodynamic characteristics of model sailplanes was given by the well-known German A/2 exponent, Max Hacklinger, who came over from Munich especially to present it. MP-11, the high A.R. A/2 tested, showed a considerable improvement in stability when turbulators were fitted. Among the many tests was an investigation into the undesirable effect of a thick trailing edge.

Finally, three short lectures were given by R. H. W. Annenberg, and stimulated some thought among the audience, covering, as they did, some notions on payload competitions, and the ideas of using a two speed rubber motor drive and using a forward rudder to reduce banks and yaw in turns.

Fully illustrated copies of the proceedings will eventually become available. Meanwhile, copies of the 1954 conference proceedings can now be bought from the L.S.A.R.A., 38, Regent Road, Aylesbury, Bucks. We recommend them to modellers who want to learn about the " how and why " of aeromodelling. They cover the following subjects:—

" The Dynamic Free Flight Model "—by W. A. Crago.

" The Development of R/C for Dynamic Model Research "—D. W. Allen.

" Model Aerofoils & Turbulence Effects "—F. W. Schmitz.

" Introduction to Aerodynamics at low R.N."—R. H. W. Annenberg.

" Aerofoil Characteristics and their Effect on Glide Performance "—R. H. W. Annenberg.

" The Development of the L.S.A.R.A. High Climb Layout "—T. W. Smith.

" Aerofoil Test Work of the Model Aerodynamics Research Project "—R. F. A. Keating.

" Development of Ducted Rocket Units (Jetex) for Models "—P. R. Payne.

" The Testing of Model I.C. Engines "—T. Dorricot and N. K. Walker.

(*Continued from previous page*)

a tailplane with only 10 per cent. of the wing area and, therefore, a loss of about 2 per cent. on the sinking speed is all that may be expected. This is of no importance whatever; it is, in fact, very much less than the loss or gain caused by a disturbance in the air through which the model flies.

When we consider that an extremely small tailplane forces us to use a very long moment arm, which leads to a structur lly difficult fuselage or tail boom—increase in weight, etc. —that trimming is made more difficult and the trim is less reliable, we may conclude that it does not pay to go to such extremes. A tailplane with an area of about 18 per cent. of the wing area will be just about the best we can choose. We should also keep in mind the fact that longitudinal stability does not improve with a very long moment arm; the moment of inertia of the model in the plane of symmetry increases as the weights are distributed further from the centre of gravity. It is therefore possible that the longitudinal stability may deteriorate and that the model will react too slowly for safety.

It may be argued—as has been stated in the opening paragraphs—that the overall aerodynamic efficiency of the model will be improved by transferring as much area as possible from the tailplane to the wing. A simple calculation will show that the actual area under consideration is so small—about 3-5 per cent. of the total area—that no measurable improvement may be expected on that score. So keep the tailplane small, but not too small!

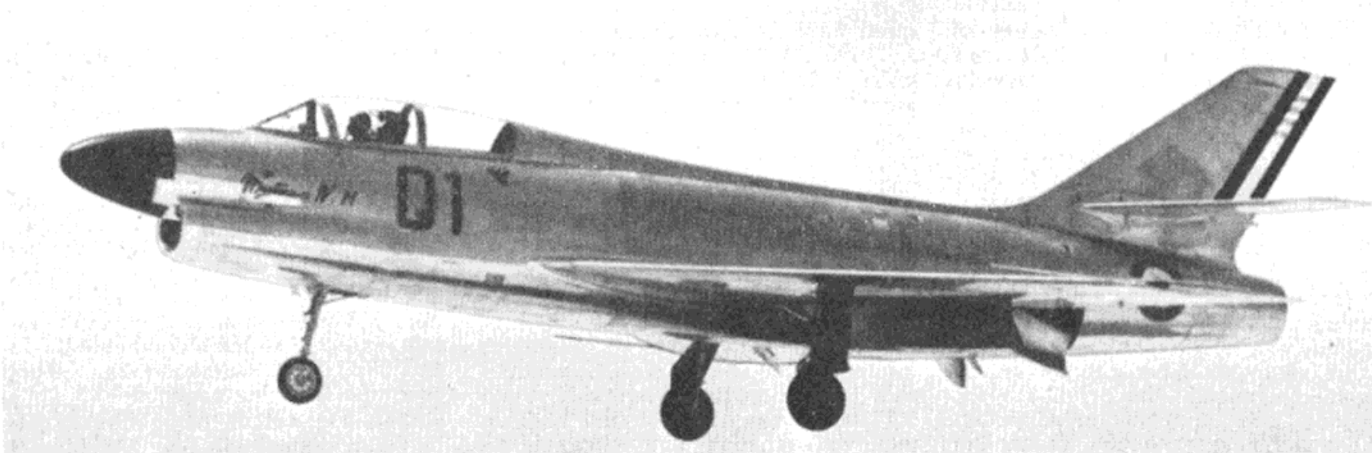
Area of tailplane in terms of wing area	Area of wing in sq. ft.	Loading on wing area in oz./sq. ft.	Forward speed and sinking speed	The moment arm in terms of wing chord; distance from c.g. to mid-tailplane chord.
0.1	3.28	4.42	1	8
0.12	3.22	4.50	1.009	6.7
0.14	3.17	4.58	1.018	5.7
0.16	3.11	4.66	1.027	5
0.18	3.06	4.74	1.036	4.5
0.20	3.01	4.82	1.045	4
0.22	2.96	4.90	1.053	3.6
0.24	2.91	4.98	1.062	3.3

Data: Total weight of model—14.5 oz.
Specified area—495-525 sq. in. here taken as 520 sq. in.—equals 3.61 sq. ft.
Tail moment arm based on the formula:

$$K \text{ equals } \frac{\text{Area Tail}}{\text{Area Wing}} \times \frac{\text{Dist. from c.g. to mid-tailplane chord}}{\text{Chord of Wing.}}$$

A useful value for K is 0.8, which has been used here for calculating the moment arm.

THE MYSTERE FIGHTERS



WITH such a dazzling array of *Mystère* variations on which to base our scale plan, we settled for one of the less familiar, although possibly more interesting, versions, the *Mystère* IVN. Actually there have been so many major design changes in the *Mystère* fighter family that some of the aircraft are virtually new designs.

The "family" had its origins in the Dassault M.D.450 *Ouragon* (*Hurricane*) fighter, the *Mystère* I being little more than a swept-wing version employing the same fuselage and Hispano-Suiza Nene engine. The first of three prototypes completed its maiden flight on February 23rd, 1951, the remaining two flying the following year, but having the more powerful Hispano-Suiza Tay 250 engine.

A pre-production batch of seventeen *Mystère* II's was ordered in April, 1951, two of these being powered by the Hispano-Suiza Tay 250 and designated *Mystère* IIA. The next three had the same engine but differed in armament and became the IIB. The remaining twelve were IIC's, using different versions of the SNECMA Atar 101 turbojet. Of this pre-production batch, one IIB was fitted with an "all-flying" tail, three IIC's had 12 deg. dihedral tailplanes, while a pair of IIC's were fitted with the afterburning Atar 101F engine of 8,380 lb. thrust.

The third pre-series *Mystère* II, fully armed and powered by an Hispano-Suiza Tay, exceeded Mach 1 on October 28th, 1952, and so became the first French aircraft to accomplish this.

In April, 1953, a production order was placed for 150 *Mystère* IIC's powered by the Atar 101D engine and the first production machine flew just over a year later. This version had a top speed of 658 m.p.h. at sea level and an initial climb rate of 7,280 ft./min.

Next addition to the family was the *Mystère* III, a two-seat all-weather fighter eventually rejected in favour of the IVN. The prototype has since been used for ejector seat experiments.

Almost parallel in development to the IIC was the *Mystère* IVA, and although generally similar in external appearance to the Mk. II, it was in fact a completely new aircraft. The Mk. IVA prototype first flew in September, 1952, the first production machine being delivered in June, 1954. Some 325 *Mystère* IVA fighters have been ordered and the majority will have the 7,000 lb. thrust Hispano-Suiza Verdon turbojet, giving a top speed of 695 m.p.h. at sea level.

A longer fuselage to accommodate an afterburner marked the next *Mystère*, the IVB, the prototype being powered by a Rolls-Royce RA.7R. Its maiden flight was made on December 16th, 1953, and two months later this machine exceeded Mach 1 in level flight.

Other structural changes include taking the air inlet duct under the cockpit instead of dividing to pass on either side, necessitating alteration in the nosewheel retraction method. But a more obvious clue to determine the IVB is provided by the nose inlet aperture, which has an upper lip similar to that of the F-86E *Sabre* containing radar telemeter equipment. Production IVB's have the afterburning Atar 101G turbojet replacing the Rolls-Royce engine of the prototype.

With versatility being a strong feature of the *Mystère* designs, it was hardly surprising that eventually a two-seat night fighter or all-weather fighter would be added to the family. As can be seen from the photograph and plan, the *Mystère* IVN has a tandem cockpit and a large nose radome, giving it a nose-heavy appearance. The main undercarriage legs retract inwards into the fuselage and wing roots, and the nosewheel forwards. Air brakes are fitted on the rear fuselage. Armament comprises two fuselage-mounted 30 mm. cannon with electronic tracking and firing devices, and the IVN can also carry 128 air-to-air rocket projectiles.

The prototype IVN, which first flew on July 19th, 1954, has a Rolls-Royce Avon RA.7R with afterburner, but can also take the Atar 101G engine.

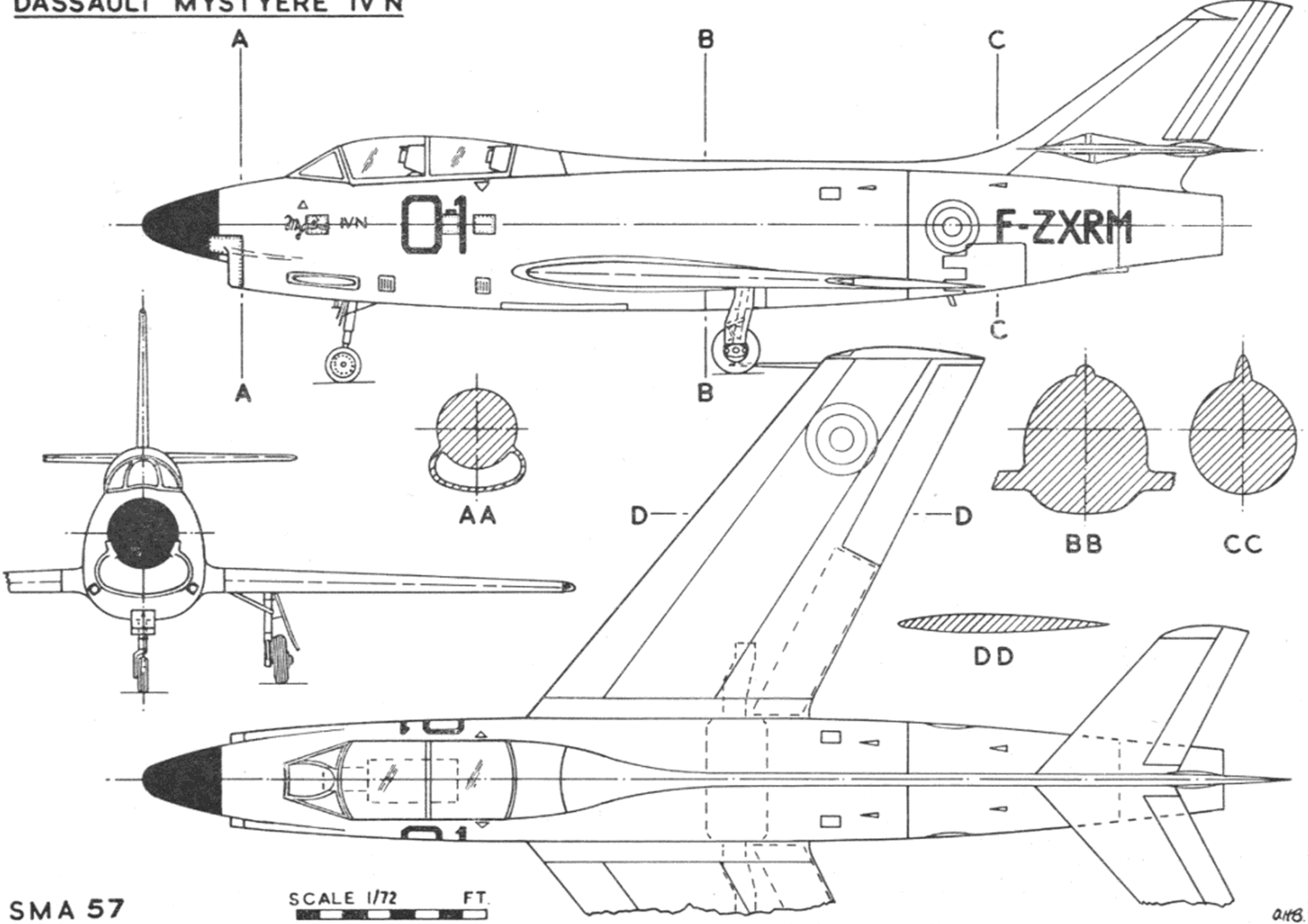
So far no production order has been placed for the IVN, although the French are proposing it as a standard European all-weather fighter.

Mystère IVN Data:

Type: Two seat all-weather fighter. Dimensions: span 36 ft. 4 in., length, 48 ft. 6 in. Engine: One Rolls-Royce RA.7R of 7,500 lb. thrust without afterburner. Weight loaded: 23,060 lb. Performance: max. speed at sea level, 725 m.p.h.

Copies of plans published for solid models can be obtained in 1/72 scale, from "Model Aircraft," Plans Department, 19-20, Noel Street, London, W.1, price 9d. each, post free.

DASSAULT MYSTYÈRE IV N



SMA 57

OVER THE COUNTER

International Model Aircraft will be introducing to the market in the very near future a whole range of new 1/72 scale detailed moulded plastic solid kits, probably the most completely detailed of any in the world. The name "Penguin" is not to be revived for this series and further unlike the pre-war models the new Frog scale series are moulded in polystyrene. Kits will be complete with moulded stand, polystyrene cement, etc., and will include such attractive prototypes as the *Hunter*, *Sabre*, *Canberra*, *Javelin*, *Meteor*, *Venom*, Sikorsky helicopter, etc. Many thousands of pounds have been invested in dies for these models and the pre-production work involving the preparation of drawings, patterns and finally the dies (much intricate detail on these having to be hand tooled) has taken over two years.

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Other new Frog kits announced are a 27 in. span flying scale glider (*Skylark*), a 20-in. span Junior glider and a new simple flying scale series starting with the Moth *Minor*, *Bird Dog*, *Seamew*, etc. The latter average about 22 in. wing span and are the start of a Senior Scale Series, counterpart of the present "Junior" kits. Expect the first of these new kits to reach your model shops early in the New Year.

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With the Keelbild galleon range now featuring 12 different kits, Kielkraft expanding their range of galleons, Model Aerodrome of Birmingham now gone over exclusively to ship model kits, Verons giving at least equal interest to boat models these days and Ripmax now predominantly "marine," nautical interest seems strong in the model aircraft trade world. Jasco have just come out with a 2s. 11d. "beginners" kit for a Barbary Coast Pirate Ship (complete with skull and cross bones flag!) which should have a particular appeal to younger enthusiasts.

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Ripmax announce a water-cooled version of the new J.B. "Atom" 1.5 (they do the conversion, i.e. fit the water-cooled cylinder jacket) for 72s. 6d. Price of conversion for an existing "Atom" is 18s. The same firm now also put out the E.D. "Hornet" as a complete marine power unit, comprising engine fitted with water-cooled jacket, exhaust stubs and flywheel. Price is 90s. 6d.

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The pack for a new resin-based adhesive, Mixafix, is illustrated below. Mixafix is a high polymer cement with exceptional sticking qualities which produce a joint some five times as strong as normal air-drying adhesive. It is of particular interest to modellers because it will bond together aluminium and other metals strongly enough to withstand light duties. In common with other resin adhesives it is unaffected by weather, boiling water, acids and spirits when set. In addition to providing a good joint between metals it will adhere to glass, Bakelite, vitreous enamel and glazed tile, as well as materials such as wood. Mixafix is in two tubes. An equal quantity of the adhesive from each tube is mixed before use. The pack costs 5s. and is available from hardware stores.

*　*　*

News of Skyleada kits this month is that their 16 in. flying scale series has been completely revised from the production angle. Kits now include plastic propeller and are reboxed in new styling. One or two of the older models have been dropped from the series and the current range of 12 models includes three entirely new designs—the *Gannet*, *Bonanza* and D.H. *Beaver*.

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Jetex fuel prices have had to be increased, following rising costs in production. Modellers might be interested to learn that this is a non-profit line as far as Jetex are concerned. The fuel, manufactured by Imperial Chemical Industries, is sold at cost.

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Keilkraft's latest kit is another old-timer—the 1914-18 *Nieuport* in the rubber-driven flying scale range. The increase in purchase tax has now raised the price of this range to 3s. 9d. (originally 3s. 6d.).

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It is unlikely that any new supplies of Pirelli rubber will be imported into this country. Latest price quoted from Italy is more than twice that of British strip and at this figure neither the trade nor the modellers will be interested.

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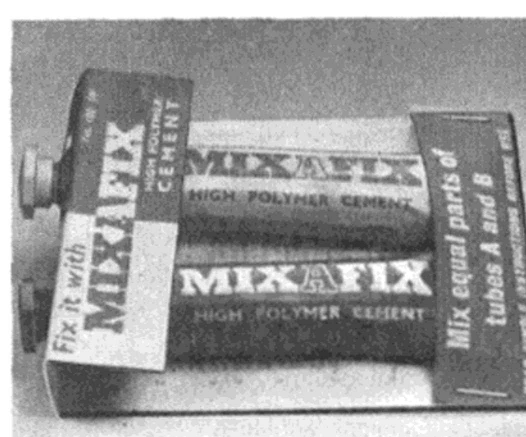
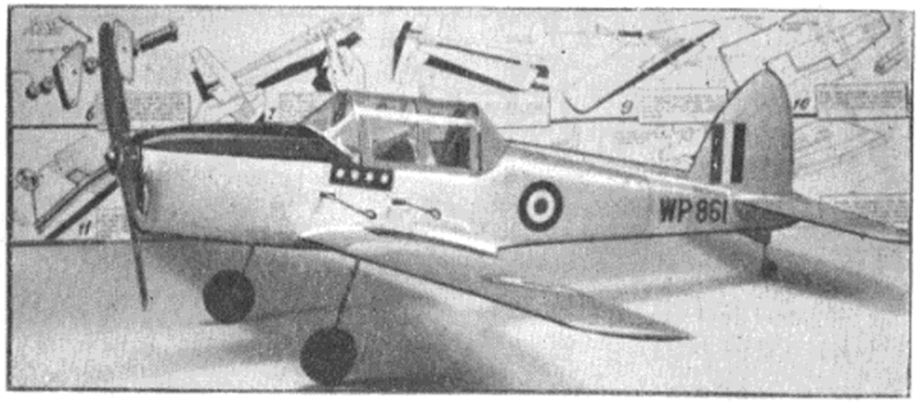
Correction: The price of 56s. 6d. given for the Elfin 1.49 Standard in the advertisement pages in last month's issue should have been 55s. 6d.



OVER THE COUNTER
KIT REVIEWS

DAVIES CHARLTON

CHIPMUNK



Designed by Ronnie Moulton, this is a 20 in. span scale C/L model for the Allbon Dart or Merlin, employing sheet construction throughout. Presentation of the kit is on American lines—the plan being replaced by a plan-size sheet of step-by-step building instructions (the art quality of which is the highest we have seen on any model instruction sheet), together with a small g/a detailing colouring and markings.

Kit wood throughout is of the best quality, most of the parts being printed on balsa sheet, although the wing is cut to outline shape in $\frac{3}{8}$ in. sheet. Adding to the completeness of the kit is all the necessary "hardware," as our American friends call nuts, bolts and similar items, wheels, wire, tank parts, etc., and a really large sheet of transfers.

The finished model is as neat a scale job as you could wish for, quite easy to make, and incorporating some excellent design features. Our own model, complete with Merlin, weighed in at 6 oz. dead in flying trim, with the resulting c.g. about $\frac{1}{8}$ in. in front of the pivot point, perhaps just a little too far aft for safety (and even more critical with the lighter Dart, had it been used), but this could easily have been adjusted during construction. We would recommend, in fact, that when assembling, the pivot point should be located at $1\frac{1}{4}$ in. back from the leading edge of the wing. Ours, using the push rod dimension detailed on the instruction sheet, came out at 1 in. behind the leading edge.

This, however, must be regarded as a minor point of what is undoubtedly a very fine kit—far and away better than the average run of such kits and a thoroughly interesting project for any scale-minded enthusiast. We unreservedly recommend it.

Building tips acc· ulated during construction of our .est model are: watch the "handing" of the sides at stage 1 or you may end up with two "left" sides; at stage 3, sharpen one end of the brass tube supplied for the tank vents and use as a gouge to shape the leading edges of the elevators to fit the dowel torque rod; a small notch in the fuselage to clear the torque rod is a worth-while addition to stage 5; lock elevators with a bulldog clip at stage 7 when locating control plate; cut the V for dihedral in the wing before carving at stage 9; a V-notch in the ply dihedral brace is asking a lot at stage 10, reducing the depth of the ply to let the wire lie flush is easier; don't get the fuel pipe the wrong way round (stage 12)—we did; locating slot in the ply former for Merlin installation requires packing to fill, unless you have remembered that this slot is only the width of the ply bearer when you cut it (13); the cowling is crowded, but it does all fit in (15).

Do fit the cockpit glazing before painting, in the sequence shown, otherwise you will inevitably smear the finish. Yellow is one of the most difficult of colours to cover with, and about six coats will be necessary over the silver base to get a really nice finish. The black and yellow trim should be matt, incidentally, not glossy.

Flight performance is essentially sports model standard—quite fast considering the size of the engine and pleasantly smooth in control response.

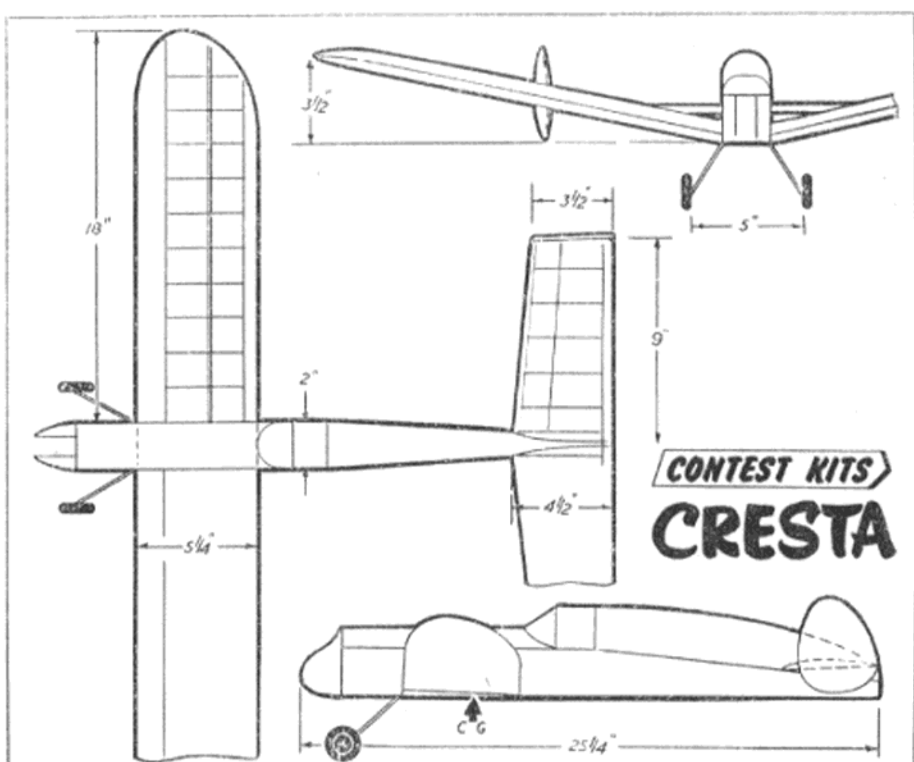
CONTEST KITS

CRESTA

A nice name, a very nice kit, but a rather ugly model. Nevertheless this low wing F/F design should have a particular appeal to sports fliers, as the whole job is so essentially practical.

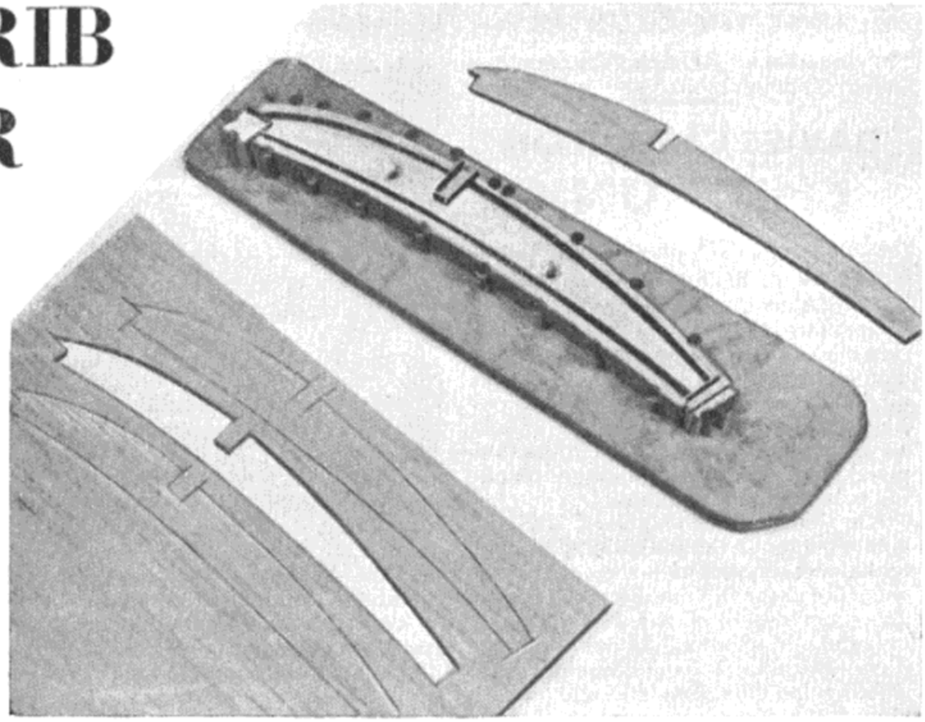
Endplate fins, sheet fuselage sides and ribs are supplied ready cut to shape. The remainder of the sheet parts are printed out on balsa together with additional sheet for covering and $\frac{1}{4}$ sheet for the cowling. Strip selection includes shaped trailing edge stock. Wheels are plastic and it is nice indeed these days to find a kit complete with cement. A modeller's kit for modellers, in fact.

Starting only about a year ago, Contest Kits have gone ahead in the commercial field with enthusiasm and have already built up quite a representative range. Quality of presentation has continued to improve with each new kit, and if the plans are still a little "utility" by modern standards, the printed instructions fill the gaps. Our rating of the *Cresta* is that it is a kit for the modeller with some previous experience, when it will give him a rugged, satisfying model with hours of flying.



TRY THIS RIB PRODUCER

by K. Hastings



Gain extra seconds on the flying field and extra minutes in the workshop with this easy-to-make gadget

THERE is little doubt that the most boring and tedious job with which the modeller has to contend is that of cutting-out wing ribs. It is probably due to carelessness in this direction that many model fliers fail to get those extra seconds that would bring them to the top of the contest list. While most modellers appreciate the need for accuracy, few seem prepared to make that extra effort necessary to produce correct sections.

One solution to this problem is to mass produce the ribs with a cutter, which admittedly takes a little time to make, but does ensure identical ribs. The rib-producer shown in the heading picture and diagrammatically in Fig. 1, works well with any grade of 1/32 sheet and will operate successfully with $\frac{1}{16}$ soft and medium-soft sheet.

As the ribs are easy to produce it is a practical proposition to make them of 1/32 sheet instead of $\frac{1}{16}$ and to space them more closely in the wing, which will ensure an accurate section with less tissue sag between ribs. The rib-producer should also prove a boon to the contest fliers who use the same basic design throughout the flying season.

Construction

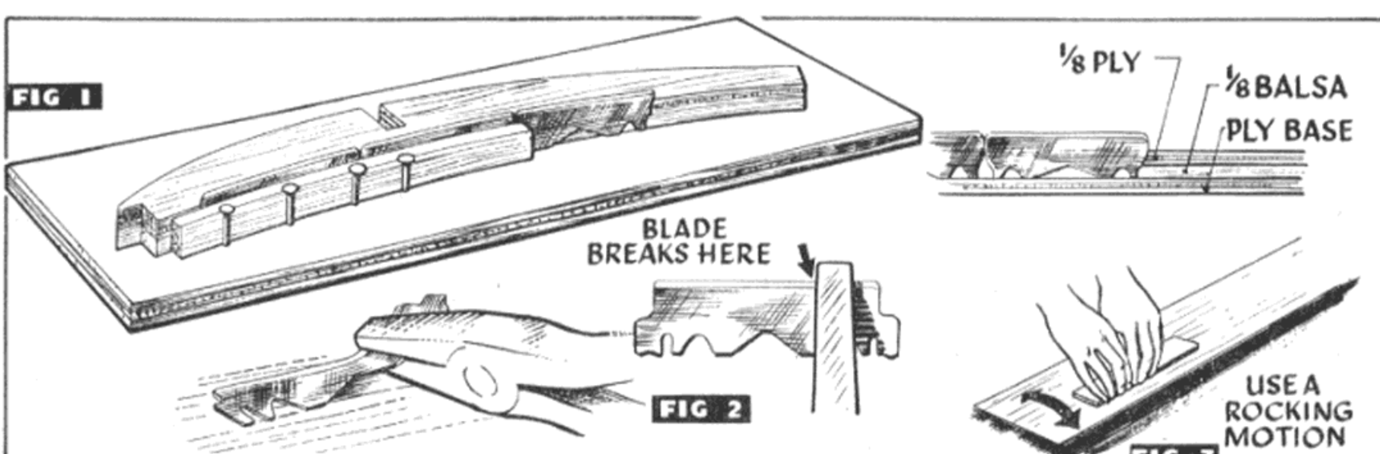
The basic arrangement is simple: on a backplate, which can be made from plywood or a wooden block, the chosen size of wing section, carefully cut from $\frac{1}{8}$ three-ply backed with $\frac{1}{8}$ balsa is mounted. The section is surrounded with pieces of razor-blade held in position with cement and by strips of wood, which are in turn retained by small nails.

The pieces of razor blade which form the cutters must be broken and handled with extreme care. The best method to use is to hold the blade at the place to be broken with a pair of pliers and to press the razor blade on to a flat surface. See Fig. 2. To drop a piece of cloth over the pliers and blade while breaking is a worthwhile safety precaution against pieces of broken blade flying in the air. Also carefully collect the unused pieces of broken blade and dispose of them as they are potentially dangerous if left about.

Using the Rib-producer

When using the cutter a rocking motion will be found to produce the cleanest cut—see Fig. 3. It is best to cut the number of ribs required before detaching them from the sheet. Then detach them by running a modelling knife round the cut line.

Finally, do not leave the rib-producer lying around cutter face upwards. Embed the blades in a piece of soft balsa sheet and put the cutter in a box until it is needed again.



Topical Twists

Watered Down

The drift of radio modellers to the paddling ponds is still continuing at quite an alarming rate. And it seems the reason is that the newcomer to the hobby is too easily discouraged. Moodily surveying the mangled remains of the 20 quid radio gear and the ten quid engine lying among the wreckage of his first model—such a beautiful 60 bob kit—he is apt to yield too quickly to the temptation of drowning his sorrows in the nearest pond. But pushing the boat out, literally or otherwise, is not, we are told, the solution to happy radio modelling. The bleep box tyro should manfully put away all childish thoughts of boats and have another " bash."

Of course, it would be highly insulting to suggest to the scientifically minded newcomer of today that he should restrain his enthusiasm for the big and spectacular, and, instead, serve a useful apprenticeship on a simple sports model. It's embarrassing enough for him to appear in public with even the largest radio model now that they have been given away as prizes in the junior newspapers. And, anyway, he's not interested in all that toy aeroplane kid stuff. All he wants is something large and impressive which works by the magic wonder of R/C. An aeroplane, fashionable and exciting, is the obvious choice, but if the silly things will crash, a model boat will, at least, give endless hours of harmless, scientific fun. So why not leave our press button age operator down at the paddling pool where he's happy?

Drama Dept.

The countryside used to be a restful sort of place before the coming of the Archers and model flying. Rural ructions are, alas, the order of the day in those quiet retreats where once tranquility reigned over all, and where even the rude peasantry were obliged to drink their soup with muffled spoons. With the alien diesel vibrating the ancient church steeple like a tachometer and the incessant barrage from the twelvebores of cornfield-patrolling farmers, there is nowhere left to go for a quiet bit of model flying.

Considering the general farmer-hostility towards us harmless model fliers, it is surprising to read of a farmer's son electing to become hon. sec. of his local model club. The situation, however, seems to give scope for some good old rumbustious melodrama.

The scene opens with apoplectic farmer crying down dire vengeance on all crop trampling model hooligans. In a fury of rage he takes down a spiked horse whip and prepares to go forth to ferret out the unspeakable hon. sec.—the leader of the vandals. Son now boldly confronts father and confesses his grievous sin. Whereupon farmer froths at mouth, and is carried off to his featherbed on a five bar gate. Son pleads for father's forgiveness in vain—and so it goes on.

A happy twist to the story would be for the erring son to heroically rescue his father's pet model-chewing goat from the combine harvester, and all would end in sweet forgiveness. A more up-to-date twist could be introduced by the gallant son failing in his heroic attempt. Then, as in the final scene, youthful hon. sec. and model-chewing goat disappear into the innards of the harvester, the farmer exclaims reproachfully, " Just a couple of mixed up kids !" (All comes well in the end, however, as they manage to bale out.)

Going to Pot

Not so many years ago the heart rending cry of modellers everywhere was for a light and efficient power unit. Manufacturers have long since satisfied this demand with featherweight engines of amazing simplicity and power output, and might well have rested on their well-earned laurels had they not been faced with yet another touching appeal. Since only one in umpteen model engines ever reaches the airborne state, prop flickers are pleading for something more in the nature of a mechanical toy. The manufacturers are answering by adorning their units with extra cylinders, and, already, the twin pot versions of the diesel are rearing their ugly heads.

There are many advantages of the twin cylinder unit over the orthodox one. It is twice as noisy, twice as heavy, takes twice the time to start, and is half as powerful. For less than double the price, therefore, prop flickers are getting double the value.

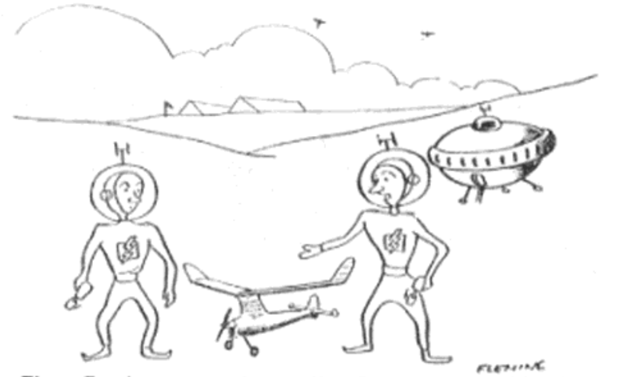
We can now look forward to future power units sprouting as many pots as the O'Donnell sideboard. Such is progress.

A Dressing Down

Our visiting teams abroad have been roundly criticised for manfully upholding our proud tradition of flying field scruff order. Amid all the frou-frou elegance of embroidered track suits and décolletée dungarees, that proud emblem of our national heritage, the oil stained flannel bag, continues to flout the modern tendency of feminine frippery and gadabout glamour. Hardly a cause of criticism, you might say. Quite the reverse, in fact. Apart from the manly dignity the flannel bag imparts to the wearer, it retains, together with the cement caked jacket, a healthy respect towards model flying as a weekend hobby; rudely challenging the quaint notion, held by the foreign chappies, of its being a sport.

Admittedly, the scruff order has its drawbacks—being directed to the local doss house by finicky hotel proprietors, for instance, but highly practical, in that its scarecrow appearance can often allow one to pass unnoticed in the middle of a cornfield.

However, if we are to take the plunge and dispense with our casual attire in favour of some elegant national dress, we have a wide and enchanting choice: pin stripe suit and bowler, knee length shorts and pith helmet, umbrella and raincoat, and Teddy Boy outfit. Anything outside this exclusive range would only make our English lads feel ridiculous. But this insistence on glamour make-up is all very well. For my part, so long as there is a pair of English braces dangling over a foreign field, I'll be happy in the knowledge that models are still being flown just for the un-nationalistic fun of it.



These Earthmen must be small to fly in machines like this.

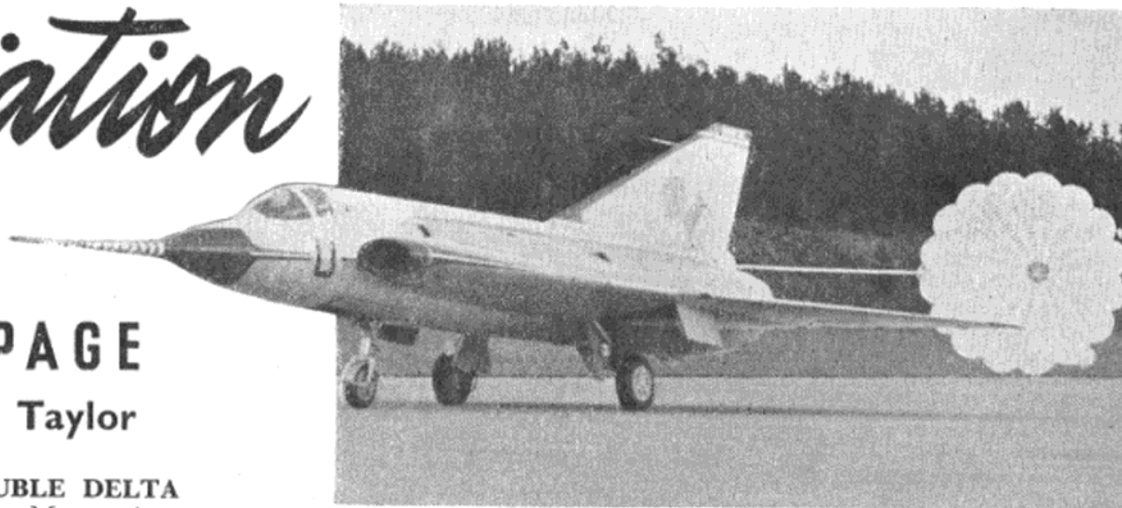
Adding a postscript to these notes on overseas dress, we learn that something of a sartorial sensation was caused by the keen character who hitch hiked his way to the World Champs from Manchester. Begrimed, bearded and still slightly damp, the appearance of this typical specimen of British flying field order gave a welcome morale boost to our homesick lads, who were suffering some inferiority from all the dressy daintiness about them.

The beard, too, strikes a hopeful note. Attention to this fashionable outcrop on our flying fields could help to solve our dress problem without financial outlay. A bit of cunning topiary could give a prosperous impression of a fur-lined track suit. For this reason the cultivation of facial fungus might well be encouraged, and club wags might do well to refrain from diligent model searching in the region of the hirsute chin.

For further information on our bearded brethren the reader might wish to refer to my latest pamphlet, " Aeromodelling, and its Amazing Growth."

Pylonius

Aviation



NEWSPAGE

by J. W. R. Taylor

Speeds around Mach 1.5 are expected of the Saab-35 " Draken " (Dragon), powered by the Swedish-built Rolls-Royce Avon R.A.7R which gives 9,500 lb. thrust with after-burner in operation.

The *Saab*-35 **DOUBLE DELTA FIGHTER**, forecast in MODEL AIRCRAFT just a year ago, made its first flight on October 25th and has already clocked some impressive high supersonic Mach numbers. As expected, it is almost identical in shape with the little *Saab*-210 research aircraft, and is powered by a Rolls-Royce Avon turbo-jet, with after-burner.

The air intakes, first tested on the modified *Saab*-210, are built into the wing roots in such a way that the fuselage nose boundary layer air passes inboard of them, ensuring a high intake efficiency. Combined elevators and ailerons are fitted to the wing trailing edges, and all controls are servo-operated. Control rods and other services run along the spine linking the fin and cockpit, and are easily accessible for maintenance. To reduce the space needed by the main undercarriage units, their shock absorbers are shortened automatically during retraction.

The *Saab*-35 will gradually replace the *Saab*-29 "Flying Barrel" in service with the Royal Swedish Air Force, under the designation J-35 *Draken*. Its fixed armament of cannon is intended to be supplemented with underwing rockets and air-to-air guided weapons: and it is radar-equipped for all-weather navigation and flying at very high altitudes. Top speed should be at least Mach 1.5.

* * *

Looks like we can say **GOOD-BYE TO DELTAS** of the old simple kind. Following the lead of the *Saab*-35 and *Javelin*, Avro have introduced compound sweepback on the leading edge of the *Vulcan's* wings. The decreased angle of sweep begins in the usual place, at about half-span: but at three-quarter-span, the sweepback is increased again and the chord at the tip is unchanged.

The mod. is being flight tested on the second prototype, VX777, and will be standard on production *Vulcans*. Avro claim it will permit the fullest operational use to be made of more powerful marks of Olympus turbo-jet that will soon be available. Certainly, the reduced thickness/chord ratio on the outer wing should improve both high and low-speed performance and handling, without entailing any other structural changes or delaying entry of the aircraft into service with R.A.F. Bomber Command.

* * *

Britain's leadership in **JET-LINER DEVELOPMENT** seems to have been lost irretrievably. The *Comet* 4 may well prove successful; but the larger Vickers *V.*1000 has been abandoned, and American airlines have, as expected, put their money on home-made goods.

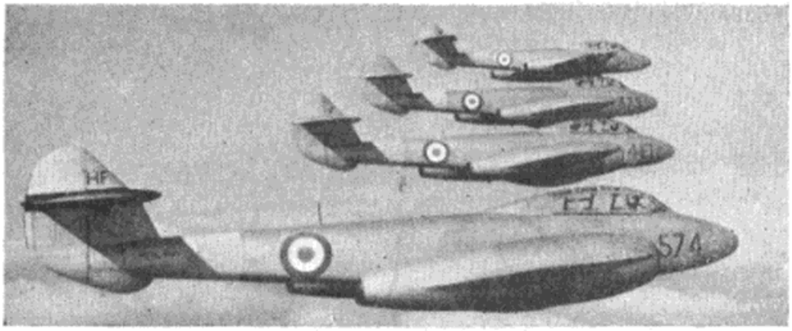
Pan American led the way, by ordering 20 Boeing 707*s* and 25 Douglas *DC*-8*s*, each powered by four 10,000 lb. thrust J57 turbo-jets, at a total cost of £96 million. Delivery of the Boeings, which will carry 104 first class or 125 tourist passengers, will begin in December 1958. The first of the 108-131 seat *DC*-8*s* will follow a year later. Both types will cruise at 575 m.p.h., making possible a non-stop 6¼ hour London-New York service.

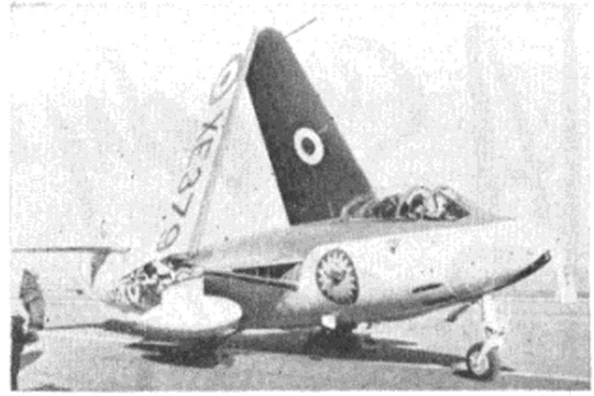
Since the Pan. Am. orders were announced, American Airlines have ordered 30 707*s*, United Airlines 30 *DC*-8*s*, and National Airlines 6 *DC*-8*s*.

* * *

Lockheed's *Electra* will be up against very serious opposition from the **VICKERS V.900 VANGUARD,** which promises to be the answer to an airline chief's prayer. In its B.E.A. form it will carry 93 passengers, plus an unusually large amount of luggage and freight, and will make money when only 30 seats are filled. When its four Rolls-Royce RB.109 Tyne turbo-props develop their full 4,150 h.p. in due course, the *Vanguard* will cruise at 425 m.p.h. Its fuselage capacity is

The compound sweepback on the leading edge of the wings of " Vulcan " VX777—the second prototype—will be standard on production " Vulcans."





Royal Navy "Meteor" 7s of R.N.A.S. "Hal Far," Malta. Right: This photo by John Taylor shows a "Sea Hawk" of No. 898 Squadron aboard H.M.S. "Ark Royal"

greater than that of any airliner yet ordered into production, and it is suitable for all stage lengths between 200 and 2,500 miles.

B.E.A. saw more than 60 different design studies before settling on the *Vanguard*. They favoured a high wing; but this would have entailed an undercarriage retracting into the fuselage, with an unpleasantly narrow track.

OTHER B.E.A. NEWS is that the corporation has increased its order for 22 *V.802 Viscount-Majors* and also ordered a fleet of *V.806s*, which will have 2,000 h.p. R.Da.7 Darts and a cruising speed of 360 m.p.h. They will supplement, and not replace, the V.701 *Viscounts*, which will be used on lower-density routes.

Also cooking are helicopter services linking Midland towns with Birmingham and London in the spring, new tail markings for all B.E.A. aircraft, allocated seats for passengers to stop the "rat-race" to be first aboard, high-density *Elizabethan* conversions and a long-awaited decision on the choice of a DC-3 replacement.

* * *

How lazy can you get? Passengers at Dallas Airport, Texas, will soon not even have to walk or climb aboard a coach to get to their airliners. They will simply step on to a rubber conveyor belt, which will carry them from the terminal buildings to a waiting plane. The belt will then go underground, turn and emerge again to carry other passengers from another aircraft in the reverse direction.

SAD NEWS for those who expected rotor tip-drive to solve all helicopter torque problems is that American companies have found they cannot manage without an anti-torque device. Even the simplest one-man helicopters are being fitted with tail rotors, and the little two-seat Hiller *HOE-1 Hornet* now has a completely new tail-end, with inverted-V stabilisers as well as its single-blade anti-torque tail rotor. Alternative, and simpler, scheme, being tested by Fairey's on their Ultra Light 'copter, is to put a small movable rudder in the exhaust from the conveniently-placed Palouste turbo-generator.

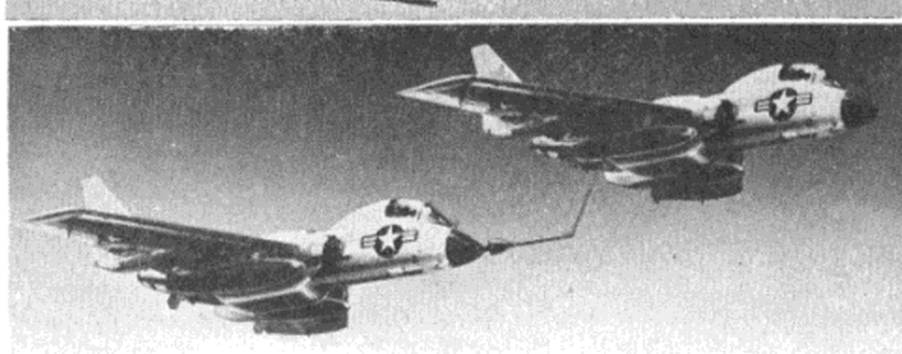
* * *

Latest idea in flight refuelling adopted by the U.S. Navy is the **"BUDDY CONCEPT,"** in which one standard jet-fighter transfers several hundred gallons of fuel to another, to extend its range with a full operational load. After the transfer is complete, the "tanker" can return to its carrier, remove the external refuelling pack, and revert to a normal fighter or fighter-bomber role.

First aircraft to use the "buddy" pack is the Chance Vought F7U-3 *Cutlass*. Its easy adaptability into a tanker enables a carrier commander to have a long-range supersonic striking force without any reduction in the number of fighters available for normal short-range duties.

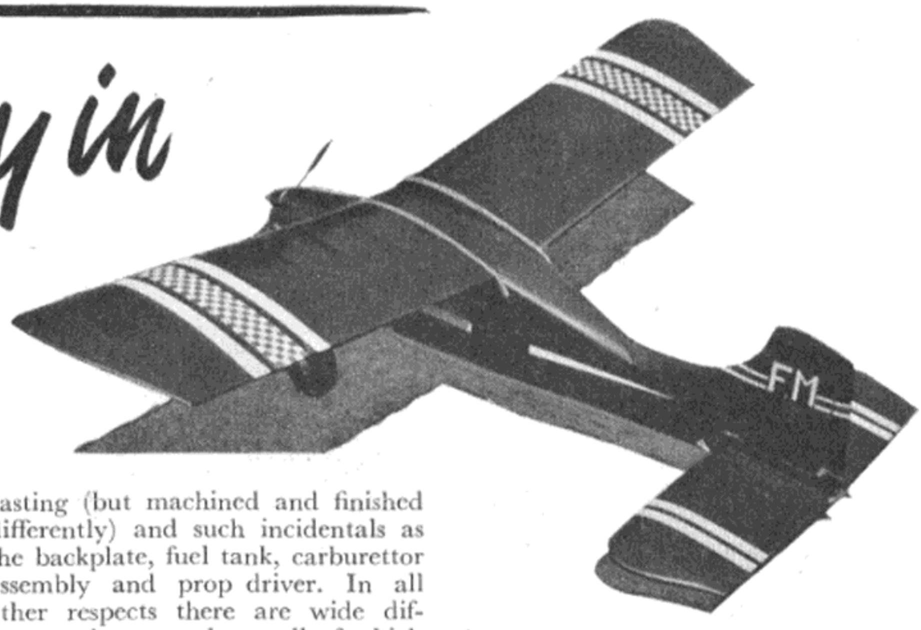
* * *

McDonnell are developing an *F4H* fighter from their *F3H Demon*. The new aircraft is said to be a two-seater, with new engine and armament.



Top: The two-seat Hiller HOE-1 "Hornet" with its new tail end and a single blade anti-torque tail rotor. Below: Acting as "tanker" here is a Chance Vought F7U-3 "Cutlass." It carries several hundred gallons of fuel in an external pack, which on return to the carrier is removed, the aircraft then reverting to its normal operational role.

A Study in Design



A radio-controlled model from Japan. Built by a Mr. Miyamoto of the Ogawa Model Manufacturing Co., it is equipped with a Japanese O.S. "Minitron" receiver and Max-15 engine.

ACCENT ON POWER
by
P. G. F. CHINN

WHEN Keith Storey, president of the American Academy of Model Aeronautics and former sales manager of the McCoy Products Company, came to Europe for the World Championships, he also brought with him a pair of the new type McCoy 0.049 (0.8 c.c.) engines for the writer to try out. One of these is a glowplug engine and the other a diesel. They replace the previous McCoy glowplug and diesel units of this capacity and are entirely fresh designs.

The reason why these two engines are so interesting is that, apart from one or two quite unique features, they are a striking example of a designer's appreciation of the manifold differences in design requirements between glowplug and diesel engines.

Externally, the two units show an obvious family resemblance. Internally it is quite a different story. There is no question of the diesel being an adaptation of the glowplug engine, or vice versa.

Basically, these engines are both shaft-induction, rotary-valve, reverse-flow scavenged two-strokes. They use basically the same crankcase casting (but machined and finished differently) and such incidentals as the backplate, fuel tank, carburettor assembly and prop driver. In all other respects there are wide differences between them, all of which are there for a purpose.

As we have said, these engines are of the reverse-flow scavenged type. To digress for a moment, it will have been noted that we have made use of the term "reverse-flow scavenged" to a greater extent in recent articles. This is because, with the many different types of so-called "radial" porting that are now in use, it becomes necessary to find a more accurate general term to differentiate between these and the loop-scavenged type.

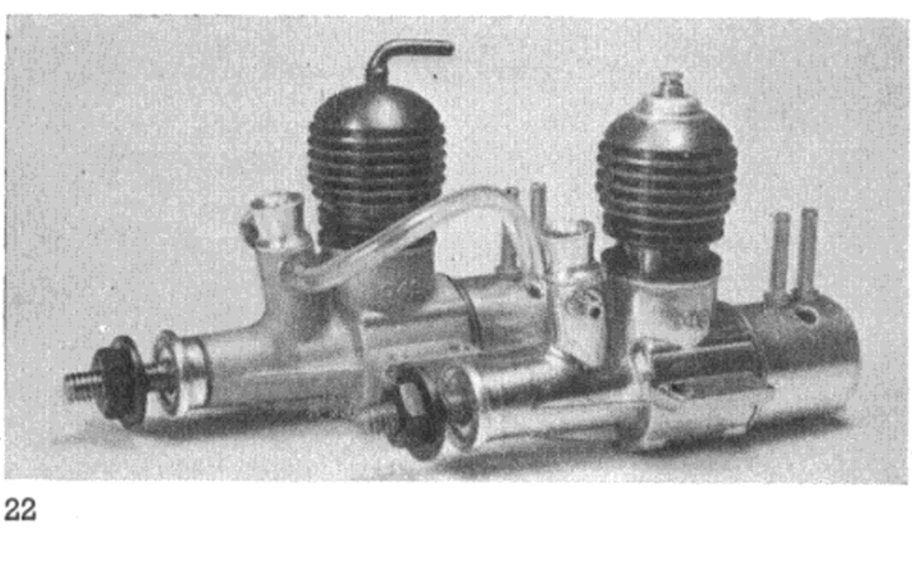
Loop-scavenged engines are those in which the charge enters through one side of the cylinder and is deflected upwards on that side, across the cylinder head and down the other side towards the exhaust port, driving the exhaust gases before it.

Reverse-flow scavenged cylinders are those in which the charge enters the cylinder at two or more points, the new gas travelling up the centre of the cylinder, then reversing its direction and driving the remaining exhaust gases down the sides of the cylinder to the exhaust ports.

Both these definitions are necessarily general and there are exceptions which it is difficult to fit into either category with any certainty, but, for our purpose, they are good enough.

Loop scavenged engines are easily identified and comprise such well-known types as the Frog 500, Eta 29, Super-Tigre G.20, G.21 and G.24, Dooling, McCoy Red-Head, Torpedo, Fox and most of the larger American glowplug types—in fact, all engines in which the transfer port is on one side of the cylinder and the exhaust on the other.

Reverse-flow scavenged systems include the Arden, Yulon Brebeck, and Oliver layouts, and are found on such engines as the Allbon, Allen, Amco 3.5, Elfin, E.D. 2.46, Frog 249 B.B., O.K. Cub, Webra, Taifun, small Atwood and the McCoy Diesel (all of which use three or more



The new 0.8 c.c. McCoy diesel and glowplug models, interesting engines which incorporate a combination of clapper-valve and shaft rotary-valve induction.

exhaust ports and transfer ports or grooves) and can also be taken to include the recently revived twin-opposed exhaust/twin opposed transfer system seen on the Cox Thimble-drome 0.049, the Super-Tigre G.25, G.26, G.28 and G.29, the O. & R. Midjet and the new McCoy 0.049 glowplug model now under discussion.

Despite the fact that they still belong to the same group, however, there is a big difference between the porting of the McCoy 0.049 glowplug and diesel models. Let us deal first with the glowplug model.

The crankshaft valve port is rectangular, measuring $\frac{3}{16}$ in. by $\frac{1}{4}$ in. and leads into a passage some $\frac{3}{16}$ in. in diameter. The valve opens at approximately 25 deg. after bottom dead centre and closes approximately 35 deg. after top dead centre, giving a total induction period of some 190 deg. of crank angle.

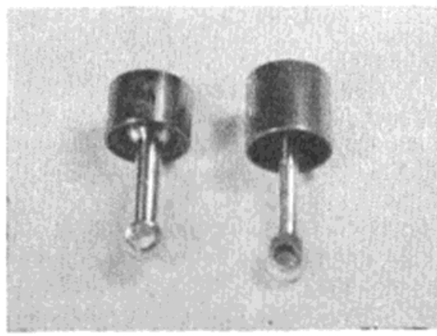
Transfer porting consists of two internal grooves in the cylinder wall, situated diametrically opposite each other. These grooves are just over $\frac{3}{16}$ in. wide and 20 thou. deep. The transfer area is not, therefore, particularly large. The transfer port timing remains fairly normal for engines of this type at about 112 deg. of crank angle.

The exhaust ports are large, being some 3/32 in. deep and each occupies approximately 105 deg. of the cylinder wall and remains open for approximately 134 deg. of crank angle. About 1/40 in. of the exhaust port remains closed with the piston at bottom dead centre. This extra depth provides for sub-piston supplementary air induction at the top of the stroke amounting to approximately 20 deg. either side of top dead centre.

In contrast to this, the diesel model employs a much smaller crankshaft valve port and passage. The valve port is oval and is approximately $\frac{3}{16}$ in. by $\frac{3}{16}$ in., opening into a $\frac{1}{8}$ in. passage. The induction period is reduced from 190 deg. to 150 deg., the valve opening later (at approximately 52 deg. after bottom dead centre) and closing earlier (at approximately 22 deg. after top dead centre). To partially compensate for the reduced volume of gas admitted, sub-piston supplementary air induction is increased to cover a period of 60 deg. of crank angle.

Transfer of the charge from crankcase to combustion chamber is via four short passages between the crankcase casting and outer wall of the cylinder liner, which open into an annular chamber under the cylinder flange, whence they are admitted through three radial slots. The actual transfer period is quite short—only 100 deg.

The three exhaust ports are placed approximately 0.025 in. above the transfer and are similar to the transfer ports but are wider and slightly deeper. They occupy a total of approximately 300 deg., or five-sixths, of the bore. The exhaust period is unusually long, the ports remaining open for approximately 74 deg. each side of bottom dead centre.



McCoy piston and con-rod assemblies. Short rod and short-skirt piston, left, with heavy gudgeon pin is diesel assembly. Glowplug model has lighter components with ball and socket small-end bearing.

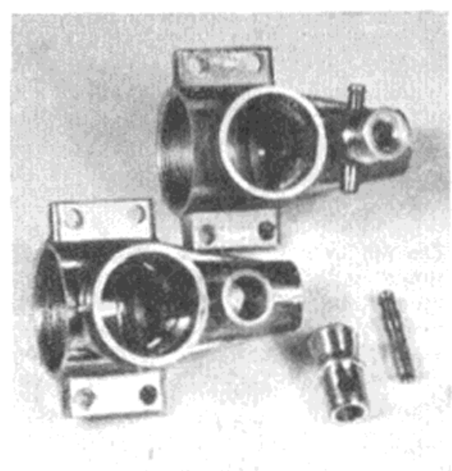
Turning now to the general structural design of the engines, the crankcases, as we have said, are made from the same casting. However, the diesel unit is bushed with a bronze main bearing whereas, in the glow model, the shaft runs direct in the case material. The diesel is further distinguished by its matt grey finish, which contrasts with the polished surface of the glowplug model. There are also some minor machining differences, specifically in the threads into which the cylinder liners are screws.

Cylinder assemblies are, of course, entirely different. Some idea of these differences can be gained from a glance at the accompanying photographs. The diesel model uses the normal contra-piston set-up, but, as on the earlier McCoy diesel, and unlike all British and Continental diesels, the contra-piston does not depend on a ground fit to seal the bore. Instead, a synthetic rubber compression-ring, generally called an " O-ring," is employed.

Some doubts were expressed in other quarters two or three years ago when these O-rings first appeared but, in the writer's experience, they have much to commend them, particularly in the matter of improved compression seal, lack of any tendency towards seizing, and smooth adjustment. It is, perhaps, significant that one of the largest British model i.c. engine manufacturers has lately conducted extensive tests and will, if a satisfactory material can be obtained in this country, switch to the use of O-rings in place of the present ground contra-piston.

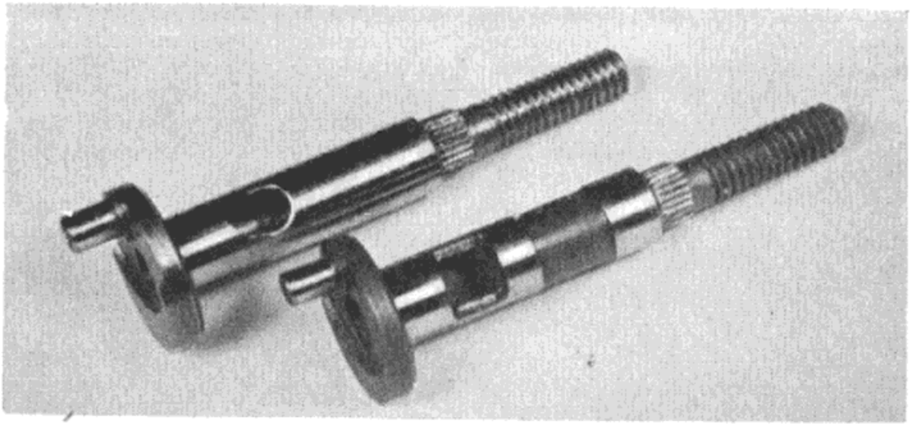
Another unusual feature of the McCoy contra-piston is the fact that it is flanged at the top to prevent it from being screwed down too far with the compression lever. This, of course, precludes any possibility of the contra-piston hitting the piston and causing damage through mishandling. It is made practicable from the production standpoint by the fact that the use of the O-ring rules out the need for the commonly practised plunge grinding system of finishing.

A by-product of this limit on the maximum obtainable compression pressure is that the engine demands a relatively " hot " fuel when lightly loaded with a small prop, otherwise the ignition point cannot be sufficiently far advanced to deal with the high r.p.m.



McCoy 049 crankcases. The diesel unit (above) has a bronze bearing and is matt finished. The glow unit (spraybar and choke-tube removed) has a plain bearing and polished external surfaces.

Both engines use a machined alloy finned cylinder barrel which screws over the upper part of the cylinder liner. In the diesel version, the threads on this part of the cylinder liner, 11 in number, extend practically the entire distance from the

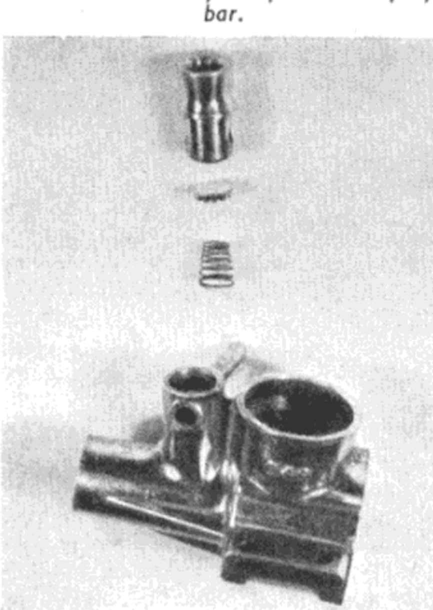


McCoy 0.049 crankshafts. Left is the diesel shaft with full-length journal, heavy crankdisc and crankpin and oval induction port. The glow engine shaft has a larger volume induction passage and separate front and rear journals.

exhaust belt upwards, which is just as things should be. On the glowplug model, in which there is less risk of overheating and distortion, barely three threads are used. Similarly, the more highly stressed cylinder-to-crankcase threads on the diesel are twice as many as on the glowplug unit.

The earlier McCoy diesel employed a fibre insert in the cylinder head to prevent the compression screw from loosening with normal vibration. In the new model, this excellent idea is continued and improved, and instead of the fibre friction pad, which tended to wear after considerable use, a small coil-spring device is incorporated in a recess machined in the underside of the head, which grips the compression-screw with exactly the right tension.

The McCoy clapper-valve. A light coil-spring seals the square valve plunger against the bottom of the choke tube, which is retained by the pressed-in spray-bar.



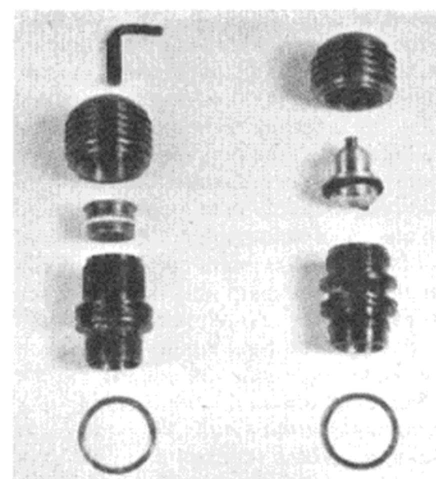
In the glow model, the usual glowplug is dispensed with and a separate cylinder head, flanged to seat, via an asbestos gasket, in the top of the bore and having a built-in filament, is retained in position by the finned barrel. As we suggested in these columns several years ago, the use of conventional glowplugs in small bore engines is, at least in some small way, responsible for the low specific outputs of "half-A" class glowplug engines by comparison with those of larger types, due to the somewhat irregular and inefficient shape of the combustion chamber caused by the plug. The McCoy, with its built-in element, is a logical development of the trend started by the Cox 0.049 engine and the same system is also employed by the new Italian Super-Tigre G.28 and G.29 glowplug units. (See photograph.)

The overall crankshaft dimensions on the two McCoys are the same, but, as befits a diesel, a heavier crankdisc and a larger diameter crankpin are used. Also, while the glowplug model has a relieved section, ¼ in. long, in front of the valve port, thus providing two journals, 15/32 in. and 5/32 in. long, the diesel retains the full ⅞ in. support of its bronze main bearing. A further concession to the heavier stressing of the diesel is seen in the wall thickness of the hollow section of the shaft, which is 100 per cent. more than of the glowplug model.

The piston and connecting rod assemblies are a remarkable testimony to the designer's appreciation of diesel structural requirements, as opposed to those of the glowplug ignition engine. The glow engine uses a long, slim shank dural rod with a ball-and-socket big-end fitting under the piston crown, retained by a circlip. The piston is light, with a long skirt to eliminate any possibility of piston rock due to the deep exhaust ports. The diesel assembly is entirely different. The con-rod is short and rigid with a heavy shank. An extremely heavy duty gudgeon-pin type small-end is used, featuring a ⅛ in. dia. solid bronze gudgeon-pin and a 7/32 in. wide con-rod eye. The short-skirted piston has very heavy walls.

Of all the noteworthy features of these two new McCoys, however, perhaps them ost interesting, and certainly the most unique, is the clapper-valve carburettor. (See photograph.)

This feature is common to both engines. It consists of a spring loaded valve, below the jet, which opens and closes automatically with crankcase depression and compression. The operation is, of course, similar in this respect to that of a reed valve. In this case, however, the valve does not replace normal rotary valve induction but is supplementary to it.

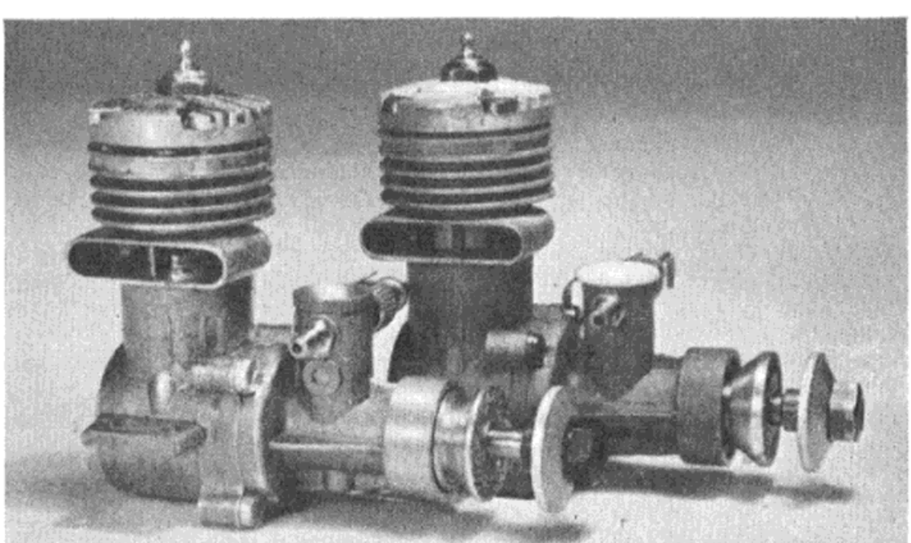


McCoy 0.049 cylinder components. Left is the diesel assembly with flanged contra-piston fitted with an O-ring. Glow version has separate cylinder-head with built-in glow filament. Bore and stroke of both engines are 0.405 in. x 0.386 in.

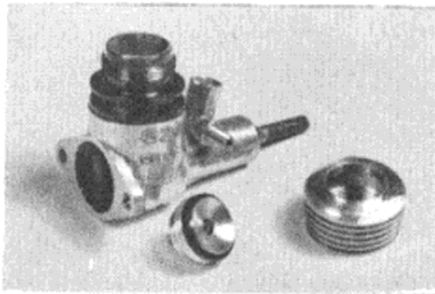
According to our present knowledge, a well-designed rotary valve can still provide the maximum possible power with a model two-stroke, but only within relatively narrow r.p.m. limits. Outside these limits the efficiency falls off, particularly at the lower speeds where blowback, due to the advanced timing, causes excessive fuel consumption, loss of power and difficult starting. The reed-valve largely overcomes these latter disadvantages because it times itself automatically to the requirements of the engine.

The object of combining the two systems is no doubt to try to obtain the best of both worlds. Some further development work will probably be necessary to determine whether, in fact, this can be realised and, so far as the present two McCoy models are concerned, the more advanced timing of the glowplug model would seem to suggest that this engine would benefit greater than the diesel. Nevertheless, it must be recorded that, from our own test results, the performance of the new McCoy 0.049 diesel is a substantial improvement on that of the original McCoy 0.049 diesel with straight shaft-valve as featured in the "Engine Tests" series a little over two years ago.

As was to be expected, the diesel model gave considerably greater power than the glow version at moderate speeds. Rather surprisingly, however, the diesel retained its superiority right up to the maximum speeds tested, which were some 18,000 r.p.m. Compared with the original McCoy Diesel, which was, itself, a quite outstanding performer, the power output is about 15-20 per cent. up, at medium to high speeds and the gain is even greater at ultra-high speeds above the peak. Using a fairly vigorous flick, starting was at all times reliable and most noticeable was the extremely smooth running at all speeds.



The latest lapped-piston 2.47 c.c. Super-Tigre G.20 (left) seen alongside a 1953 model.



Like the McCoy, the new Super-Tigre G.29 glowplug unit employs a combined cylinder head and glowplug, which is locked in position by the cylinder barrel.

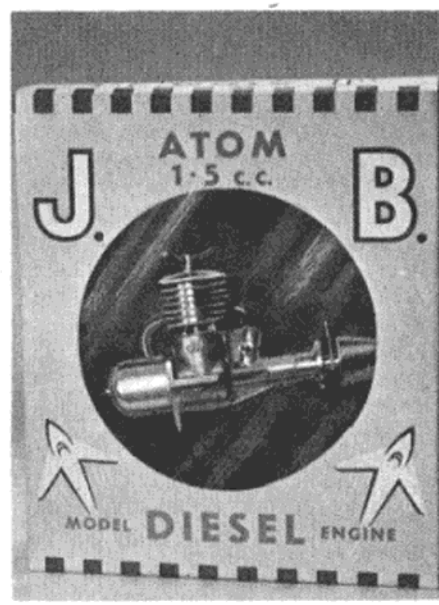
When one is handling scores of different model engines (so many of which are different in little more than name only) it is refreshing to come across something which shows as much ingenuity as these new McCoys. It will be interesting to see whether they have any marked influence on the trend of future model engine design.

The 1955-56 Super-Tigre G.20

Recently added to our stable was a lapped-piston Super-Tigre G.20 of the type used by the winning Italian team at the 1955 World Speed Championships. The engine will be the subject of a future M.A. Engine Test report and we shall not, therefore, go into details here. Basically, the engine is similar to the earlier twin ball-bearing G.20 but has a new piston, connecting rod and cylinder head, and embodies various detailed improvements. One of these engines holds the F.A.I. Class I speed record at 118.35 m.p.h. and although we have information from Czechoslovakia that a new figure of 126.5 m.p.h. (a superb effort indeed) has been claimed by Jaroslav Koci using one of the Sladky State 2.5 c.c. specials (as used so successfully in the World Championships), the Super-Tigre will undoubtedly remain one of the top contenders during 1956.

The J.B. Atom 1.5

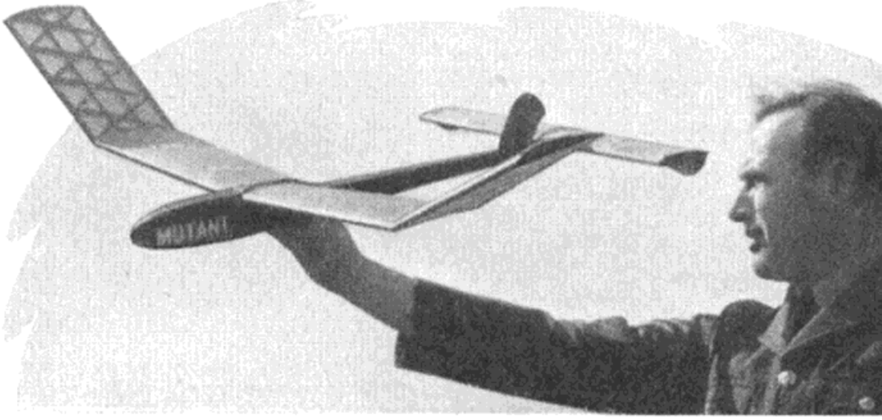
Since concluding the above, one of the first production models of the new J.B. Atom 1.5 c.c. engine has come in. This new engine is being produced by a new company under J. E. Ballard, who was formerly associated with the production of E.D. and Amco engines. The Atom is a straightforward shaft rotary-valve diesel of clean and pleasing



An indication that the British engine manufacturers are taking packaging more seriously is the way in which the new Atom 1.5 c.c. diesel is displayed. The box is printed in red, yellow and blue and the engine, mounted on blue card, is viewed through a transparent panel.

appearance. It features an unusually long crankshaft and a neat streamlined spinner-nut. The spraybar is angled to bring the needle-valve control well back from the prop disc. There are four exhaust and four transfer ports in a radial formation. Noteworthy here is the extremely long transfer period, the transfer ports opening almost as soon as the exhaust. The engine includes a robust machined aluminium fuel tank and is for beam or radial mounting. Its weight is $3\frac{1}{4}$ oz., of which just under $\frac{1}{4}$ oz. is accounted for by the detachable fuel tank.

MUTANT



A LIGHTWEIGHT OPEN CLASS SAILPLANE

by W. P. Woodrow

SAILPLANES are popular at the R.A.F. Northolt club because many of the members, who are National Servicemen, cannot afford to fly power models. But on the whole they were building their gliders too heavily until I demonstrated by designing the *Mutant* that strength need not be associated with weight and can be obtained by constructional methods.

Fuselage

Start by cutting K1 from $\frac{1}{4}$ in. sheet and by binding to it the tow hook. Then cut out formers F1 to F4 and cement in position to K1. *All* joints must be pre-cemented to give additional strength. Now cut out F5 and F6 and join together by the lengths of $\frac{1}{4}$ in. $\times$ $\frac{1}{8}$ in. Make up the auto-rudder mechanism as shown and cement in position on the struts joining F5 and F6. Cement the whole assembly to K1. Cut out the fuselage sides from $\frac{1}{16}$ in. sheet, taking care only to cut the auto-rudder slot in the port side only. Cut F11 from $\frac{1}{4}$ in. sq. Now cement the sides to F1-F6 and the tail ends to F11.

Cut out the fin from $\frac{1}{8}$ in. sheet; build up underfin and rudder from two laminations of $\frac{1}{16}$ in. sheet and sandwich the linen hinge between them. Fit the $\frac{1}{16}$ in. ply rudder horn to the rudder.

Cut three lengths of $\frac{1}{8}$ in. dowel as shown for wing and tailplane rubber bands, and cement in position. With strong twine, tie the auto-rudder line to the lever and cement the knot. Thread the line down the fuselage and through the slot on the port side of the fuselage. Cement F7-F10.

Next, cover the top and bottom of fuselage with $\frac{1}{16}$ sheet and fit the tail and mainplane platforms, ensuring that the grain of the wood runs as shown on the plan. Cement the fin into the slots in the top of the fuselage and set in position the underfin and rudder. Connect up the auto-rudder line temporarily and check for freedom of movement. From a pin make the hook to take the auto-rudder return band, and cement in place. Carve the nose block roughly from hard balsa and cement in place and when thoroughly set, finish. Finally, make the dethermaliser peg and cement into F11.

Wings

Cut out 28 ribs W2, and four to the dotted line, also make six of W1. Start by building the centre section. Shape and pin in position the $\frac{1}{8}$ in. $\times$ $\frac{1}{2}$ in. trailing edge. Make up the laminated leading edge from two strips of $\frac{1}{8}$ in. $\times$ $\frac{3}{8}$ in. and also pin into position. Now cement R1 and R2 in position, ensuring that the four ribs cut to the dotted line are in the middle of the centre section.

Now thoroughly cement in position the $\frac{1}{16}$ in. ply dihedral braces at each end of the centre section. When the whole assembly has set, remove from plane and in a similar manner build up the outer sections ensuring that the inboard rib R1 is set at the required dihedral angle.

When the three sections are completed, once again pin down the centre secion and cement the outer sections to their respective ends. and fit the $\frac{1}{8}$ in. sheet gussets as shown.

Tailplane

Cut out two ribs T1 from $\frac{1}{16}$ in. sheet and ten ribs T2 from 1/32 in. sheet. Shape the $\frac{1}{8}$ in. $\times$ $\frac{3}{8}$ in. trailing edge and pin into place, also the $\frac{3}{16}$ in. $\times$ $\frac{1}{4}$ in. leading edge. Cement the ribs in the positions as shown and add the tips made from $\frac{1}{4}$ in. sheet, and the $\frac{1}{8}$ in. sq. spar. Cut out the tip underfins, but do not fix them into position at this stage. When the tailplane has set, remove from plan and shape the leading edge and tips. Then fit the dethermaliser peg.

Covering and Assembly

Cover the entire model with lightweight Modelspan, giving the fuselage three coats of clear dope and after water shrinking the main and tailplane surfaces, apply two coats of clear dope. Now cement in position the tailplane tip underfins.

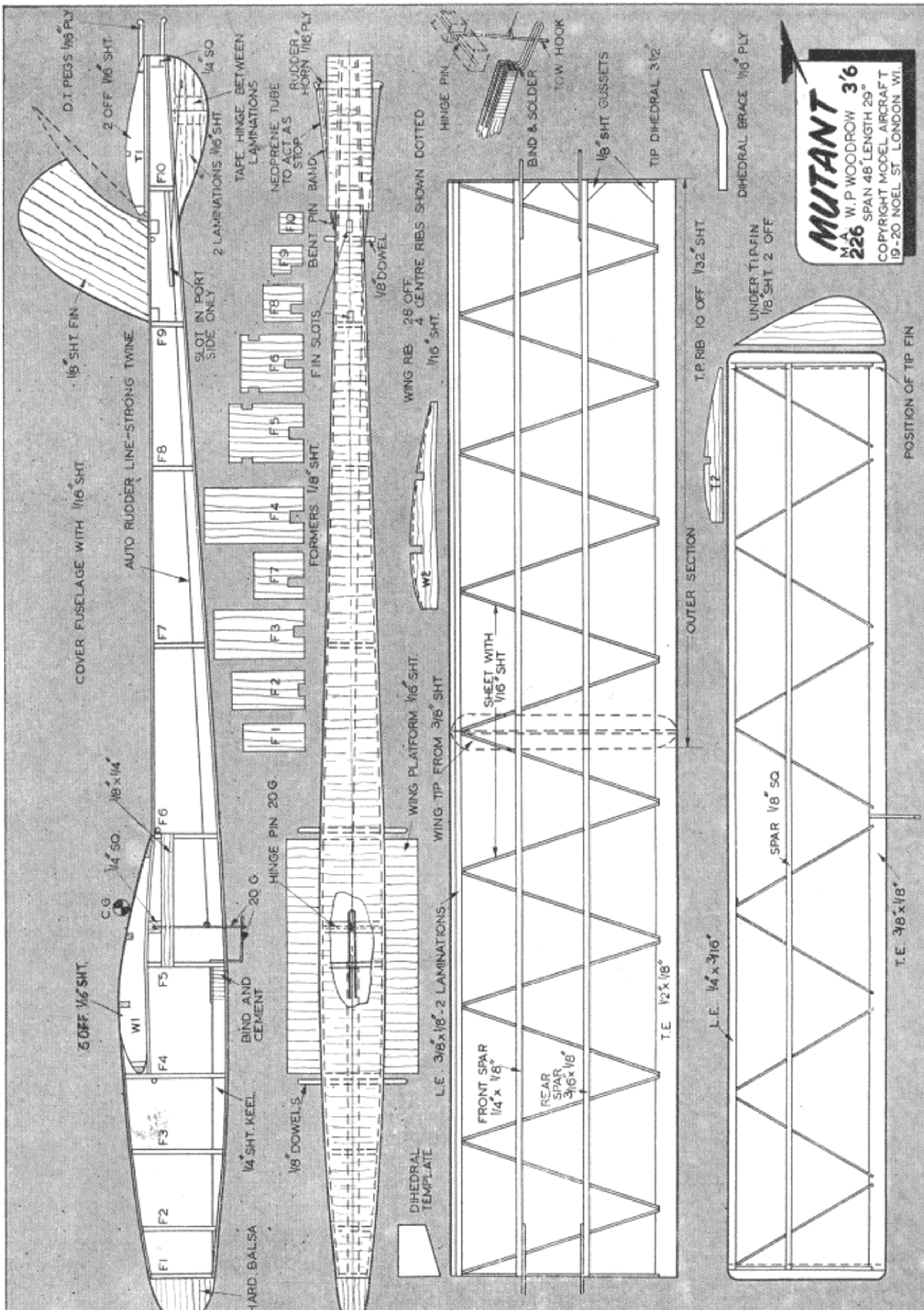
Connect the auto-rudder line to the rudder horn and adjust the line so that the rudder is in neutral when the auto-rudder lever is fully forward. Thread a rubber band through a length of neoprene tubing of sufficient length to prevent the rubber band from turning the rudder from the neutral position when the lever is fully to the rear. Now hook the rubber band to the hook on the starboard side of the fuselage, thread it through the neoprene tubing, and secure with thread to the rudder horn.

To get the required turn on the model just cut off pieces of tubing. Fit the tailplane by a rubber band from one end of the dowel, round the tailplane dethermaliser peg and back to the other end of the dowel, and check the D/T action, and finally secure with a small rubber band around the two D/T pegs. The wings are held in the usual manner by two strong rubber bands.

Flying

Add weight to the nose between formers F1 and F2 until the c.g., as shown on the plan, is correct. On a calm day hand launch the model into wind, and a long slow flat glide should be obtained. If the model shows a tendency to be nose heavy, put packing under the trailing edge of the tailplane until it is corrected. No more than $\frac{1}{16}$ in. will be required.

When satisfied with the glide, shorten the neoprene tubing until a very slight turn to the right is achieved. If a turn is present when the rudder is in neutral, this must be corrected by either shortening the auto-rudder line if the turn is to the right, or, if to the left, by lengthening the line and shortening the neoprene tubing until a straight glide is obtained.



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Book Department

Reviews of current aviation literature

Flight Fly-Past—A Portfolio of Aircraft Photographs. *By "Flight" Cameramen.* Iliffe & Sons Ltd. Price 7s. 6d.

Anyone who has ever handled a camera with an aeroplane framed in the viewfinder will appreciate the craftsmanship displayed in this portfolio of 24 aircraft photographs. The work of two *Flight* cameramen, John Yoxall and L. W. McLaren, the plates each measure 12 × 10 in. and represent a varied range of current types.

The *Midge*, aptly captioned "Dipterous Insect," is seen from afar, darting through ethereal cloud in a purposeful attitude, as though bent on delivering its bite. "Student Body" is a close up of three *Provosts*, their sedate bank to starboard conveying just the right impression of methodical training.

But of artistry there is plenty in this unusual collection, tastefully arranged and presented, and if—as we hope—further portfolios are forthcoming, then perhaps a few details of the respective photographs would not be amiss.

Aircraft Badges and Markings. *By Harold B. Pereira.* Adlard Coles Ltd. Price 5s.

This little pocket book is a useful guide to the designs and colours of civil airline badges and the national markings of 69 of the world's air forces. It contains lists of registration code letters, and the author prefaces the actual colour sections with background notes that explain the symbolic meanings of some of the designs. Altogether there are 134 full colour drawings of airline badges. While the idea of the book is sound, it is a pity that the standard of art work could not have been higher.

Supersonic Aircraft. *By Roy Cross.* Macdonald & Co. Price 6s. 6d.

Roy Cross, well known for his many fine aircraft paintings, is as facile with a pen as he is with a paint brush—at least that was our impression after reading "Supersonic Aircraft." As a matter of fact this 62-page book goes further than its title implies, embracing not only aircraft but also relevant subjects associated with high speed flight.

The reader is suitably introduced to the overall subject by way of the experiences of some famous test pilots, followed by a lucid chapter on "[Aerodynamics at Sonic Speed."

Increasing speeds have brought increasing problems on crew wear, and the latest fashions in supersonic apparel are well illustrated and described, together with methods of high speed escape.

Supersonic aircraft of France, Gt. Britain and the U.S. are explained in detail, and the final chapter deals with the heat barrier and other problems yet to be surmounted if speeds are to be increased still further.

Profusely illustrated, "Supersonic Aircraft" also contains four of the author's own superb paintings in colour.

Definitely well worth its modest 6s. 6d.

Passengers, Parcels, and Panthers. *By John W. R. Taylor.* Dennis Dobson Ltd. Price 10s. 6d.

There must be many people—young and old alike—who have only a vague idea of what goes on behind the scenes in air travel. In the author's own words: "This book takes readers behind the scenes at airports, military airfields, factories and everywhere that aeroplanes fly, throughout the world. . . ." And a fascinating picture it is, too, with chapters on such diverse subjects as "Flying the Mail" and "Spotting Ducks, Buck, and Poachers." Just how aircraft make their contribution to our everyday lives is clearly shown, and, although the book is ideal for the air-minded youngster or layman, the enthusiast also will find much of interest. John Taylor has the happy knack of presenting facts and figures in such a way that makes them easily digestible and the text is well supported by excellent photographs.

The Song of the Sky. *By Guy Murchie.* Secker & Warburg. Price 21s.

The sense of detachment that is felt when one is flying, together with the remoteness of the earth with its seemingly toy-like signs of habitation, encourage thoughts of a breadth and perspective more in keeping with the aerial view than those which arise among the limited horizons on the earth's surface. It is only to the seasoned aviator that these thoughts come, to the man who has forgotton the novelty of the first few flights and to whom the duties and business of flying an aircraft have become second nature.

Guy Murchie is such a man; he, as an experienced air navigator, has responded to the element in which he flies. Fascinated by the ocean of air which surrounds our planet, he records his observations and accumulated knowledge in his delightful book "The Song of the Sky." He traces the history of navigation from the earliest times; he is delighted with the smallest micro-organism and awed by the greatest phenomena of the air; he combines the latest knowledge on the mechanics of a storm with the poetry of nature in a manner which must have been born during long sojourns high above the ocean.

Besides descriptions of the elements

Letters

Continued from page 1

unsatisfactory compromise. It is basically unstable, so we must minimise the tendency to swing by using a narrow-track type, close to the C.G. At the same time we need a wide track to keep the wing tips from touching the ground when the surface is rough, and wheels right forward to prevent cartwheeling.

A tricycle undercarriage is a much better proposition. It will resist swing, and we can use a wide track with a nose-wheel just clear of the propeller, and so will have far more ground stability. Also, it gives good engine protection, and allows a long take-off run—very handy if you are upwind with a gale blowing.

Unfortunately, there is considerable extra drag, which causes a drop in air-speed prohibitive in present-day competition, so the trike can only be brought in by legislation. After all, one purpose of a specification is to produce safe, long-lasting models, and a trike is definitely safer, in regard to itself and the jobs it flies against. The loss of two or three m.p.h. would then be quite a good thing.

I, therefore, urge the S.M.A.E., when next the rules are reviewed, to *demand a tricycle undercarriage on "B" class team racers*, and to advocate this to the F.A.I. for International class racers, and should this pass, modify the "A" specification also.

Yours faithfully,

Montrose. NOEL FALCONER.

Red Letter Day

DEAR SIR,—In your November issue, you published a letter from Mr. K. J. McReynolds of Leicester, with which we entirely agree.

Developments in the U.S.S.R. in model aircraft and many allied subjects have been almost completely submerged in this country by making everything in the east look as if every development that occurred had a political background.

The fact that young people enjoy hobbies such as model flying, etc., was submerged with terms like "Iron Curtain" and "Communist Blocs."

If you were really concerned in raising the standard of the model trade, you would have given us many feature articles on the developments that have been occurring in the Soviet Union and the Eastern Democracies for many years. Because of this blanketing of news, when the real position does become known, the common people will realise that once again they have been bamboozled.

Please, therefore, in any further reference on this subject, leave out phrases borrowed from the "gutter Press" and get on with articles with a realistic basis.

Yours faithfully,
p.p. Atlantic Models,

Birmingham. J. SOLWAY.

Seeing Red ?— Well Strike Me Pink !

DEAR SIR,—After carefully re-reading the September "Accent on Power" article which offended your November correspondent, I really fail to see why he should be so "touchy" about the author's Soviet references. These were probably introduced to avoid repetitive words and certainly did not strike me as having any political significance. Surely the terms in question have by common usage become a part of the English language. Incidentally it is to be hoped that your Leicester correspondent never gets slapped any harder, although he perhaps deserves a gentle tap for exaggerating a mild observation into a "lecture on the socialogical problems of life in Communist countries"!

I think P. G. F. Chinn's remark about the "mysteries of life in a People's Republik" was justified, when one considers what the name "Zeiss" has come to mean in the precision engineering world. The writer would probably use much stronger terms if our own Rolls-Royce works commenced miniature engine production and marketed an inferior model.

The author of "Engines—East and West" is obviously a lover of small

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

engines, and his reviews in MODEL AIRCRAFT would appear to be extremely fair and unbiased, whatever the country of origin. He must surely have handled as wide a variety as any man living, and the benefit of his knowledge on this specialised subject is availabe for all—even Russia. Mr. Chinn, although he gives out more information than he receives from any individual country, is, in a practical way, encouraging that friendly contact so earnestly desired by Mr. McReynolds.

And now to the suggestion of State backing! Do we really want the State to look after our welfare even to the extent of controlling our hobbies? Och, mon! I am sure there are enough brains and private enterprise (Ai, and sufficient wee bawbees!) in the land of Mr. McReynold's ancestors to produce a model aircraft engine the equal of any in the world without having to beg alms from the so-called State. In any case, have the Communist countries produced a world-beater as a result of the financial help given to their modelling organisations?

Finally, it would be another of the "mysteries of life" if a man's right to fair criticism of anything depended first upon his country producing the world's best design in that particular field.

Yours faithfully,

Loughborough. M. H. WATSON.

BOOKS (continued)

in the forms with which they are met in the air, he has some good stories to tell of fliers and aviation. To complete his picture of the air he enlivens the text with some 70 drawings.

His book, evaluated as a whole, makes a striking new contribution to literature in that it stems from an experience that was unknown until comparatively recently.

The Stars at Noon. *By Jacqueline Cochran.* Robert Hale Ltd. Price 15s.

Jacqueline Cochrane's biography is as unusual as it is entertaining—which is what one might expect of a woman who holds many world air speed records, yet whose early days were spent in the poverty of a lumber camp. Her undoubtedly forthright personality is reflected in her style and the tale is packed with odd stories and incidents of personalities and places the world over.

Her working life started at eight—in a cotton mill, where at ten years old she became a forewoman! At 13 she took a job in a beauty parlour, and from there she went on to jobs in New York. Now she owns three cosmetic companies, which are worth over £1,000,000.

It was 1932 when she took her first flying lesson, and from then on aviation was to become her predominating interest. In World War II she organised and trained women pilots for the WASPS (Women's Air Force Service Pilots) and before America entered the war she flew with the Air Transport Auxiliary in England.

Her flying career is quite unique, and in fact she was the first woman pilot to fly faster than sound. Many of her records in the men's category still stand, and altogether she has won over 200 trophies.

Jacqueline Cochran's story is one that was well worth telling, and provides a magnificent example of trumph over adversity.

PHOTONEWS

EACH month, when sorting through the contributions for Photonews, we are acutely conscious of the preponderance of scale and semi-scale models. These far outnumber the contest types, and we mention this only as assurance to modellers of the latter that they are not deliberately being left out in the cold.

We can almost hear a derisive snort from Pylonius, so without going into the whys and wherefores of the matter, we draw your attention to our heading photo, a *Sky Jeep* built from a Mercury kit by Michael Hudlass. Of sturdy construction, the model will r.o.g. without difficulty using a Mills 0.75 diesel. The *Sky Jeep's* pleasing lines are complemented by an eye catching colour scheme of white overall with red lettering.

A rare bird indeed is depicted in photo **No. 2.** This model of the Britten-Norman BN-1F *Finibee* is a combined effort by Maurice Gates, who drew up the plans, and G. R. Wrixon, the builder. Believe it or not, the prototype did actually exist—just check those registration letters. It was an ultra light job built in the Isle of Wight a few years ago, but we are not sure of its ultimate fate. However, the model is certainly in a healthy state, having been flying for over three years as a radio test bed. A clockwork timer operates its four controls—rudder, elevators, flaps and engine, and with simple adjustments eighty different flight patterns can be made, states Maurice.

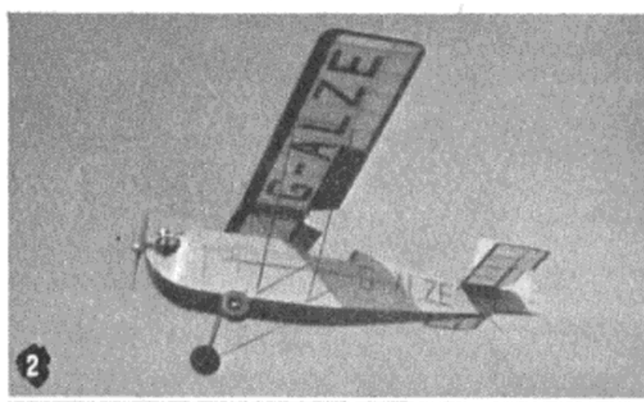
Another scale model shows off its line in photo **No. 3**—G. F. Woodworth's Luscombe *Silvaire*, constructed from a Keilkraft super-scale kit. Powered by an Allbon Dart, it takes off after a 30 yard run, thus making it a realistic performer. Coloured silver, with red trim and black lettering, its owner thinks it's a terrific sports flier, and in actual fact it gained a second place at the Ulster Nats.

Sharky is a " natural " for a model with a shark's face painted on the nose, although it is not discernible in photo **No. 4.** Which came first, the face or the name, we are not sure, but we are certain that K. Lindsey has done a creditable job considering his " workshop " was a hospital bed and his " bench," a board propped on his knees.

Sharky has a span of 74 in. and a length of 48 in. We are glad to say that the builder is now out of hospital and on the flying field again.

Two flying boats built from M.A. plans are featured in **Nos. 5 and 6.** The first is the well-known *Seagull* (M.A. 83) of C. J. Percival, shown before the final covering and the addition of the tip floats. **No. 6** depicts the *Walrus* (M.A. 153) constructed by Max Ingram, and slightly modified. At present, the power unit is an Allbon Merlin, but Max intends fitting the more powerful *Spitfire* engine.

" Ancient and modern might well be the theme of photo **No. 7.** Biplane on the left is an R.E. 8 and the



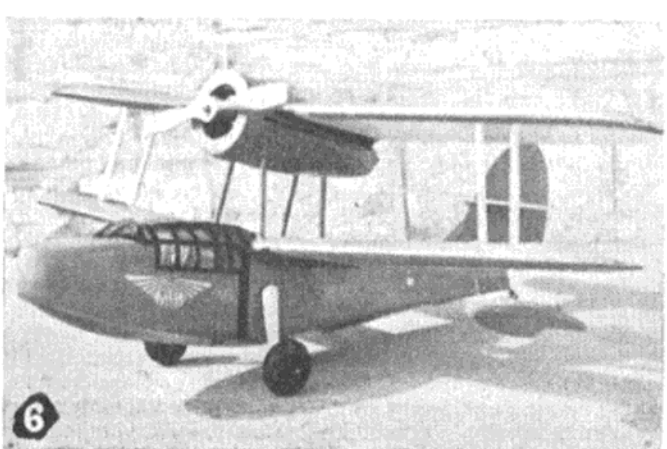
helicopter is, of course, the Bristol 173. Builder of both is C. A. Young of Rickmansworth, and he tells us that the diminutive R.E. 8 is to 1/110 scale approximately. The rigging was made with cotton and the dummy cylinders from lead tubing. The $4\frac{1}{2}$ in. long helicopter was constructed from press-out cardboard parts.

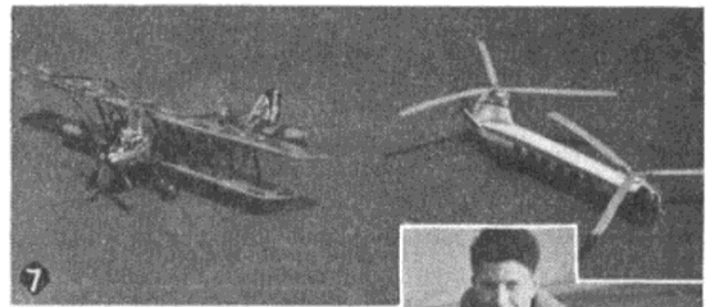
The two happy characters in photo **No. 8** are John Bell and a club-mate of Swindon M.A.C., snapped by Bob Silk on the tarmac of the club's flying ground, Wroughton Aerodrome. Their semi-contest job is the *Mezon*, a 36 in. span club design, which features a profile fuselage and parallel chord wing and tailplane, both using Clark Y sections.

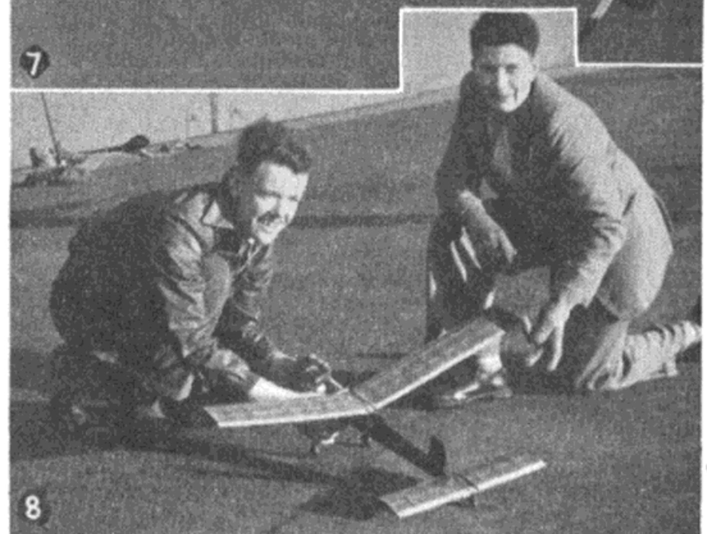
To keep his hand in at modelling, Phil Guilmant, well-known British flier now resident in Mexico, designed and built the A.2 in photo **No. 9** between siestas. The model's name is *Machete*.

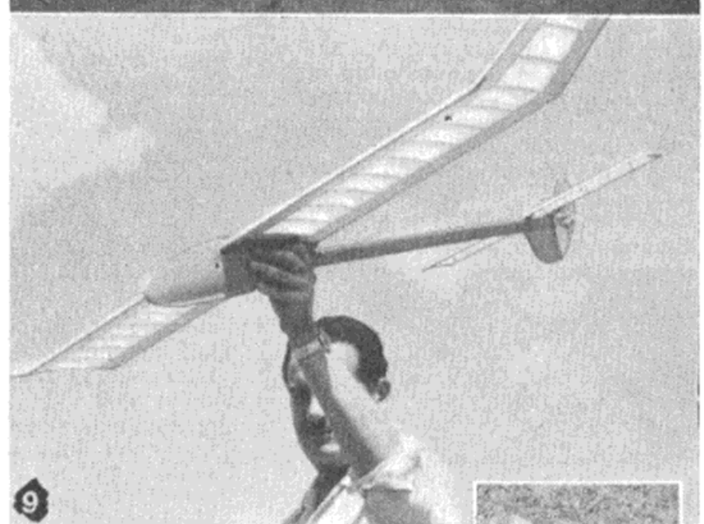
Attractive F/F Me 109F in photo **No. 10** is the work of F/Sgt. G. Robert, of R.A.F. Seletar, Singapore. Scale in 1 in. to the foot, and power comes from an Allbon Dart. The undercarriage is sprung, and that realistic camouflage—in three shades of blue—was achieved with a mouthspray. Sixteenth sheet was used for the fuselage and the rudder is pendulum operated.

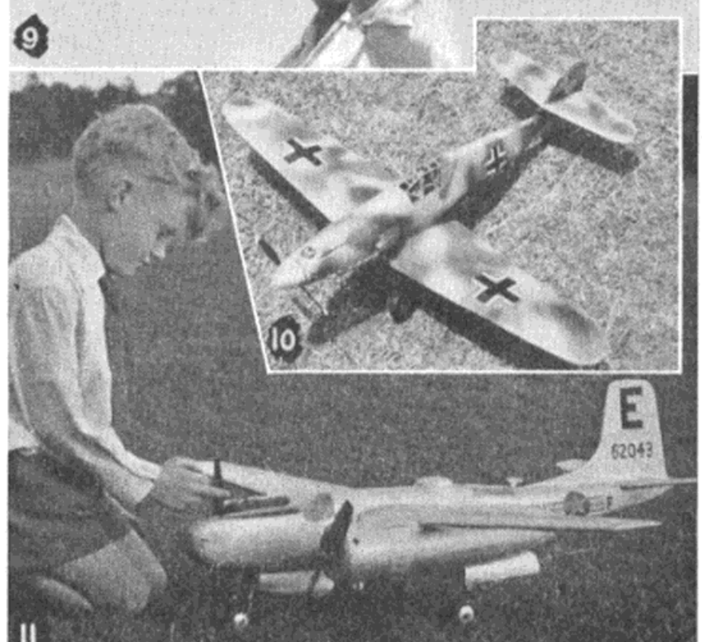
No doubt father was keeping a watchful eye on his offspring when photo **No. 11** was taken. Five year old Raymond Robson is just itching to turn those props. on father's C/L Douglas *Invader*. Elfin 1.49 and 2.49 diesels provide the power for this model, which placed second in the Concours at the Teesside Model Eng. Exhibition.











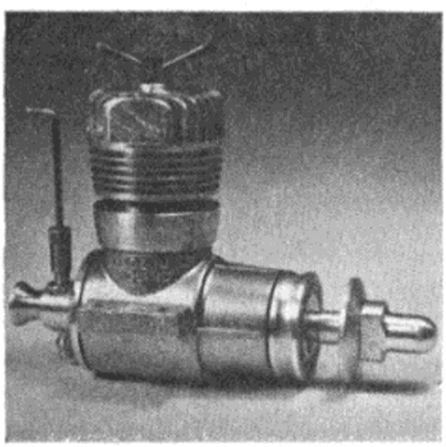
SUPPLEMENTARY ENGINE REPORTS

The model engine market has expanded very considerably since the MODEL AIRCRAFT Engine Tests series began nearly seven years ago. Obviously, it is not possible to deal with all these engines at our present rate of one Engine Test article per month. In addition to the full E.T. reports, therefore, we are presenting these condensed reports on some of the other interesting engines which have come into our hands

THE ELFIN B.R. 2.49

The Elfin B.R. 2.49 was announced some months ago, following the successful introduction of the B.R. 1.49 and 1.8 models. Both the 1.49 and 1.8 are exceptional performers (for full reports see M.A. Engine Tests, February 1955 and September 1955, respectively) and the 2.5 c.c. model has, therefore, been awaited with considerable interest by competition enthusiasts.

Unfortunately, the position regarding the supply of B.R. 2.49s is not at all clear and few of these engines have yet appeared, it seems. We received a prototype unit from the manufacturer for test some eight months ago. At that time, one or two design details had not been finalised and we were informed that production models could be expected to exceed the performance of the prototype. Our subsequent test findings confirmed that the performance of the unit was somewhat below that expected and we imagine that production delays have been due to the manufacturer's efforts



to bring the 2.49 up to the standards of performance expected of Elfin models.

The B.R. 2.49 is, undoubtedly, the best looking Elfin thus far produced and certainly one of the most attractive diesels yet seen. Construction is generally similar to the smaller B.R. type models.

Type

The engine is of the single-cylinder, air-cooled, two-stroke cycle, compression-ignition type. It has reed-valve induction via a backplate carburettor unit, and radial exhaust and transfer porting.

Dimensions

Bore: 0.566 in.; stroke: 0.618 in.; swept volume: 2.548 c.c. (0.1555 cu. in.); weight: 4.8 oz.

General Data

Aluminium alloy pressure diecast crankcase and main bearing housing with detachable screw-in rear cover carrying reed-valve and carburettor assembly. Beryllium-copper reed retained in position by compression spring and circlip. Duralumin carburettor body with locknut can be rotated through 360 deg. for any convenient needle-valve position. Spraybar type needle-valve assembly. Nickel-chrome steel crankshaft running in two ball-journal bearings. Nickel-chrome steel cylinder liner, flanged above transfer ports and secured to crankcase by external locking ring. Cast-iron lapped piston. Machined duralumin connecting-rod. Cylinder finned barrel and head of duralumin. Large diameter propeller driver machined from duralumin and fitting on crankshaft taper. Beam type mounting lugs.

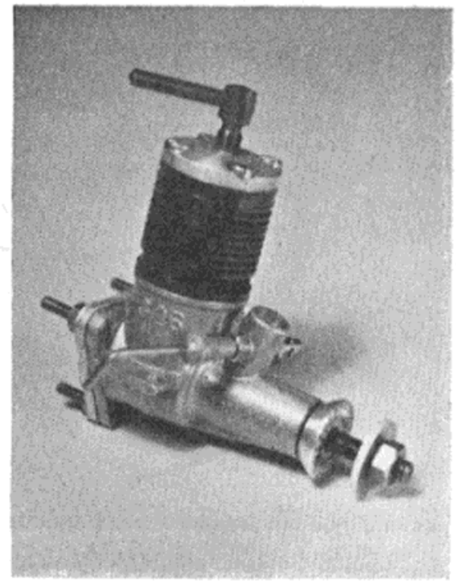
Performance

We shall keep our remarks under this heading short in view of our previous comments. The test engine obviously lacked power compared with previous Elfin models and b.h.p. figures were about 15-20 per cent. less than those realised with the original plain bearing shaft-valve Elfin 2.49. To ensure a quick start, we found that a prime through the exhaust port was advisable. Fuel used was a 40/35/25 mixture of ether, paraffin and Castrol "R," with 2 per cent. amyl nitrate added. On a 9 × 8 prop, 7,000 r.p.m. were registered, 11,000 r.p.m. being reached with a thin 9 × 4 Tru-flo prop.

SUPER-TIGRE G.26

This 1.5 c.c. Italian engine, a member of a famous family, is similar in design to the 1 c.c. G.25 model, which was the subject of Engine Test No. 64 in October 1954 issue of MODEL AIRCRAFT. Like all Super-Tigres, it is nicely made. Unlike most of its competitors, it is not readily identifiable with other engines of similar size: instead it retains a certain originality of design.

The cylinder, although, at first glance, appearing to be of the popular circumferential port type, in fact uses only two opposed exhaust and two opposed transfer ports between them. The effect,



however, is still much the same as that produced with the better types of annular porting. Transfer ports are inclined at 45 deg. to the cylinder axis and, of course, scavenging is still of the widely used reverse-flow pattern.

The piston has a bevelled crown to assist deflection of gases into the head and has a ball-and-socket connecting rod joint in place of the more usual gudgeon pin.

Type

The engine is of the single-cylinder air-cooled, two-stroke cycle, compression ignition type. It has rotary valve induction via the crankshaft main bearing, twin exhaust and transfer ports, bevelled piston head and matching contra-piston.

Dimensions

Bore: 13.2 mm. (0.5197 in.); stroke: 11 mm. (0.4331 in.); swept volume: 1.513 c.c. (0.0923 cu. in.); weight: 3.0 oz.

Performance

Readers of the Engine Test report on the Super-Tigre G.25 model may recall that it proved to have an exceptionally good performance at high r.p.m. Our G.26 model proved a little disappointing in this respect and we must assume that it may have been slightly sub-standard. Actual specific output was a little less than 80 b.h.p./litre, as against the exceptionally good 95 b.h.p./litre realised with the G.25.

Best torque was realised at 8,500/9,000 r.p.m. where the equivalent b.m.e.p. reached 50 lb./sq. in.—a figure well up to average, but which fell off more rapidly as r.p.m. were increased. General running characteristics were satisfactory and controls not unduly sensitive, but the contra-piston was rather tight and the comfortable proportions of the large compression lever were appreciated. Using Mercury No. 8 fuel, 9,300 r.p.m. were obtained on a 9 × 4 prop and 10,000 r.p.m. were achieved on an 8 × 4.

MODEL AERODYNAMICS No. 13

The "circular airflow" theory, expounded by Frank Zaic, is an ingenious explanation as to why models tend to misbehave in circular flight—particularly to exhibit drastic signs of under-elevation or change of trim.

If we consider a model performing a symmetrical loop in still air (Fig. 1), a moment's thought will show that the *airflow path* over the model is a circle (i.e. exactly the same airflow condition is given by considering the model fixed and the air flowing in a circular path).

At any particular instance, therefore, magnifying the airflow diagram as in Fig. 2, this flow is actually curving *down* where it meets the wings and *up* where it meets the tail.

The effect is even more noticeable as we reduce the radius of the loop—Fig. 3. Wing and tailplane are rigidly spaced with a certain moment arm and there is an appreciable decrease in *effective* angle of attack over the wings and an increase in *effective* angle of attack over the tail. The magnitude of each effect is the same, which we shall call $\triangle\alpha$ (change in angle of attack)—Fig. 4. Their value can be found from basic geometry and is equal to

$$\triangle\alpha = \text{angle whose sine is } \frac{\text{moment arm}}{2 \times R}$$

Since the angles involved are quite small we can justifiably adopt the approximation that (at small angles) the sine of an angle equals the angle (in radians). And since there are π radians in 180 deg.

$$\triangle\alpha \text{ (in degrees)} = \frac{180 \times \text{moment arm}}{2\pi R}$$

The *total* effect on trim is a similar change in angle (but opposite in sign) over wings and tail. Hence the total angular change is $2 \times \triangle\alpha$ or

$$\text{effective angular change} = \frac{180 \times \text{moment arm}}{\pi R}$$

Exactly the same considerations apply with a model circling in a vertical bank—Fig. 5.

In practice, no F/F model would be deliberately trimmed for looping or vertically banked flight, hence these two cases are essentially hypothetical. Some models are trimmed to circle flat without banking—Fig. 6, when there is no circular airflow effect. But a banked turn is more common—Fig. 7—and here circular flow *is* effective, although not to the same extent as in a vertical bank. The greater the angle of bank, the more nearly "vertical bank" conditions are approached, and vice versa. The practical formula therefore becomes

$$\text{effective angular change} = \frac{180 \times \text{moment arm} \times F}{\pi R}$$

where the factor F is determined from Fig. 8. This formula can be simplified still further to

$$\text{effective angular change} = \frac{57.3 \times \text{moment arm} \times F}{R}$$

The two linear factors, moment arm and R, must be measured in the same units (e.g. feet or inches).

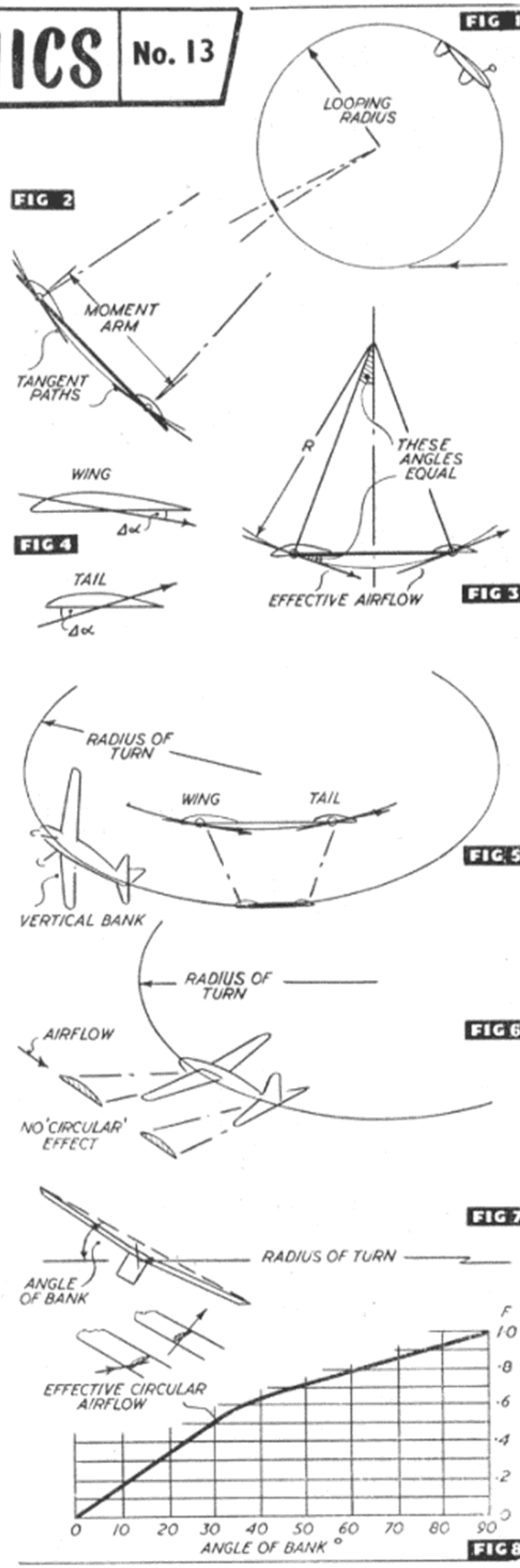
As a typical example, suppose we have a model with a 24 in. moment arm trimmed to fly a 100 ft. diameter circle with an angle of bank of 45 deg. Under such conditions

$$\text{effective angular change} = \frac{57.3 \times 2 \times 0.7}{50}$$

$$= 1.6 \text{ deg. (approx.)}$$

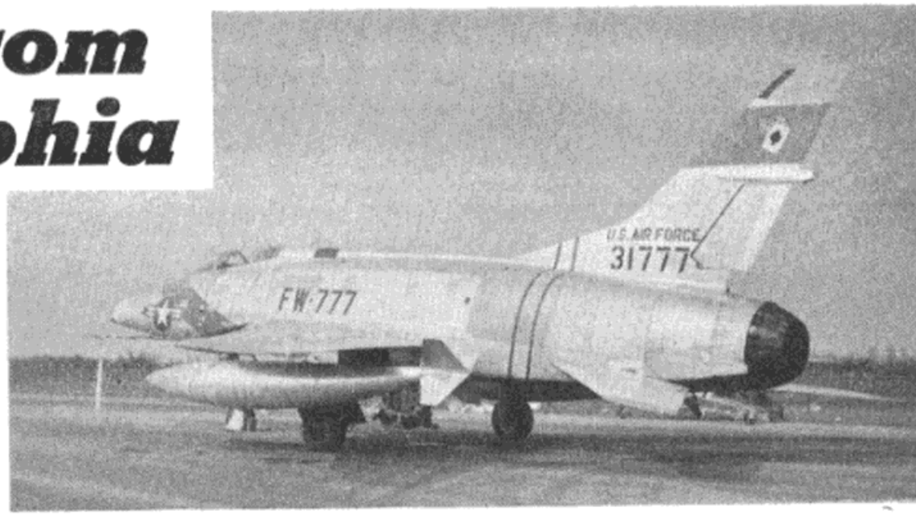
In terms of trimming angles, this represents 1.6 deg. *underelevation.* And if the circle tightened, the degree of underelevation would increase, e.g. with a 50 ft. dia. circle the effective angular change would be 3.2 deg.

Besides an explanation of why models do become underelevated in circling flight, the theory can be applied to assess the *degree* of turn required to stabilise a particular design layout, e.g. automatically reducing the effective wing lift to prevent stalling under power, although the complete picture as regards trim also includes downwash effect on tailplane angle of attack.



Photos from Philadelphia

by J. W. R. Taylor



Winner of the Bendix Trophy race was Colonel Carlos Talbott, Commander of the 322nd Fighter-Day Group, at 610.7 m.p.h. with this "Super Sabre."

WITH a 40,000-ton aircraft carrier catapulting supersonic fighters from moorings at the end of the runway, parachutists dropping on orange and white chutes, bombers arriving after near-600 m.p.h. transcontinental flights and helicopters landing assault squads of marines, America's National Air Show at Philadelphia had more super-colossal excitement and thrills than any Hollywood epic.

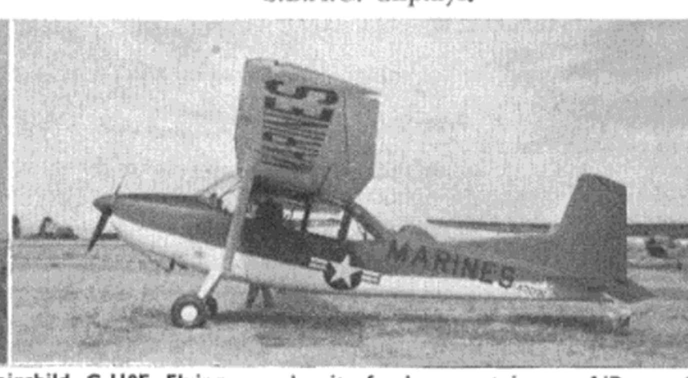
The spree went on for three days, and with so much to describe, the technical papers inevitably left out a lot of details that are of special interest to modellers. Some of the aircraft on these two pages have never before been illustrated in this country; others are rare birds or display new features like the H-34A's ability to wag its tail.

Most colourful and spectacular aircraft in the show were the four F-84F-45s of the Thunderbirds, the U.S.A.F.'s official Air Demonstration Team from Luke A.F.B., Phoenix, Arizona. Their standard formation is a diamond, with the aircraft about 5 ft. apart and with the "slot-man's" canopy some 3 ft. below the jet blast of the leader. No better indication of the quality of their flying has appeared than the following eye-witness account which was published in *Flight*:—

"A solo run at 100 ft. and 700 m.p.h. was the curtain-raiser at Philadelphia, followed by six vertical rolls to 12,000 ft. A pet manoeuvre of the four-man team is the 'whifferdill,' a vertical U-turn wherein the formation repositions from diamond to line astern. They change too from diamond to line astern in a roll, from line astern to diamond in a loop, and make a 360-deg. turn in 35 sec., calling for a speed of some 600 m.p.h. and a sustained loading of 4½-5 g. The path of some manoeuvres is traced with smoke. Finally, the '84Fs climb vertically and split to the cardinal points, returning in a vertical dive and pulling out to meet, more or less head-on, at minimum altitude and at a declared speed of 640 m.p.h."

Last year, the S.B.A.C. called on a few formations of R.A.F. *Hunters* and *Valiants* to put a little pep into their show at Farnborough. We must now hope that they will take a leaf out of the U.S. book and step up Service participation in future S.B.A.C. displays.

Left: One of the four F-84F-45 "Thunderstreaks" of the "Thunderbirds" demonstration team. Colour scheme consists of red, white and blue nose bands, red fin flash and blue stars. Right: "Cessna OE-2" in a new U.S. Marine olive and white camouflage. This version of the "Bird-Dog" has a 265 h.p. Continental 0-470 engine and square-cut tail surfaces.



1. Olive drab Sikorsky H-34A (S-58) of the U.S. Army displays the folding tail introduced to reduce carrier stowage requirements of the Naval HSS-1 version. Payload is 12-14 troops or 3,000 lb. cargo.
2. Carrying the badge of the Wright Air Development Centre of the U.S.A.F.'s Air Research and Development Command, this Douglas EB-26C "Invader" is equipped for missile guidance from its special clear-view nose.
3. Grumman TF-1 version of the S2F "Sentinel" anti-submarine aircraft is used for training. Similar aircraft are also replacing "Avengers" of the U.S. Navy's "Codfish Line" as eight passenger transports and for shore-to-ship supply.
4. The R4Q-2 is the Marine Corps equivalent of the U.S.A.F.'s Fairchild C-119F Flying Boxcar, with 3,500 h.p. Wright R3350-30W engines and ventral fins.
5. White top and star-spangled blue band around its rear fuselage identify this VC-97A "Stratofreighter" as one of Strategic Air Command's specially-equipped Mobile Command Posts.
6. Neat amphibious scheme at Philadelphia was the Hydro-Lift gear fitted round the wheels of this Bellanca 14-19 lightplane by All American Engineering. Pilot has to gain sufficient speed to plane on the skis before entering the water.
7. Production type Douglas A4D-1 "Skyhawk" baby atom-bomber, which can carry its own weight of external stores. The tank under its fuselage contains an AiResearch mobile turbine engine starter.
8. Since its early flight tests, the Bell VTOL has acquired a ventral fin. It has made a successful transition from vertical to horizontal flight configuration, by rotating its J44 turbojets.
9. Perfect in every detail, except for its serial number, this Sopwith "Camel" has been rebuilt by Commander Frank Tallman of the U.S.N.R., who has more than 24 flying hours in it. The Clerget J engine and twin Vickers guns are genuine.
10. Northrop F-89D "Scorpion" two-seat all-weather fighter, with tip tanks containing 104 Mighty Mouse air-to-air rockets and two underwing 300-gallon fuel tanks. Engines are J35-21 turbojets each giving 5,600 lb. thrust.

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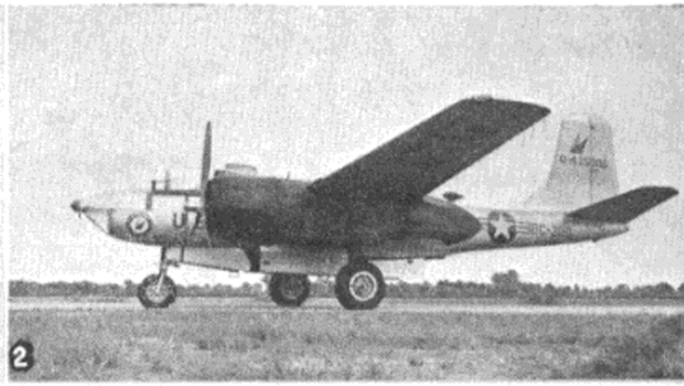
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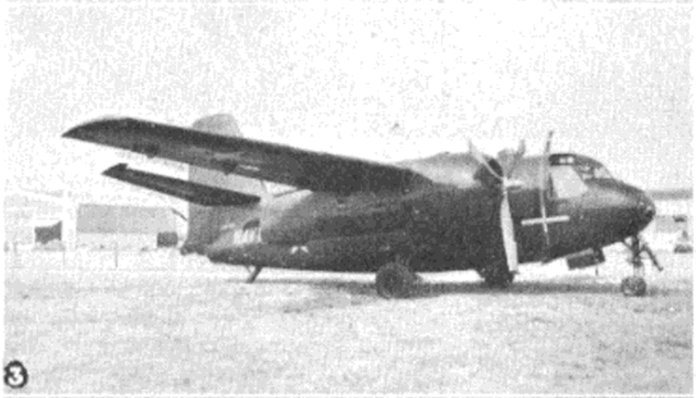
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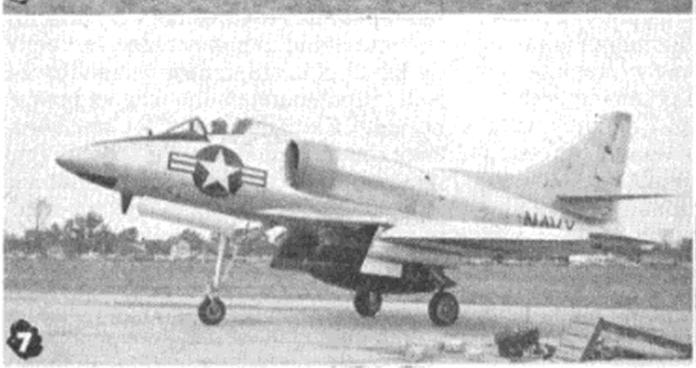
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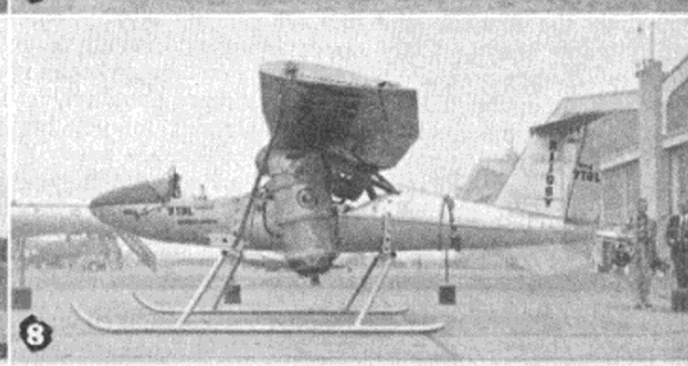
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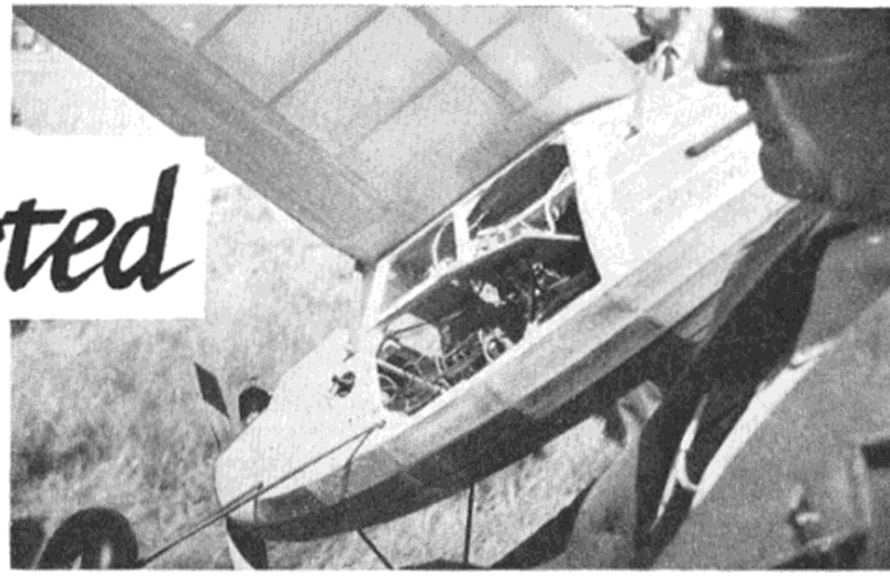
How it all started



Sqn. Ldr. Peter Hunt displays the R/C equipment mounted on his "Falcon."

PART TWO

THE man really responsible for triggering off the R/C movement in this country was Sqn. Ldr. Peter Hunt, who, during the latter war years and shortly after, developed the first practical aircraft-type receiver known outside America. By modern standards it was quite a complicated affair, employing four or five Hi-Vac miniature valves and followed the route which nearly all pioneers trod, namely that of providing a multiplicity of controls. Sqn. Ldr. Hunt, however, condemned reeds as a method of obtaining multi-control response, and operated his various controls through a sequence system utilising, if memory is correct, a telephone dial at the transmitter end to "call" for any particular control required. Many of the components and batteries used were self-miniaturised by breaking down standard radio parts. Undoubtedly, working results were obtained in a model, but the degree of success is not known.

Some time afterwards, however—around 1947-48—Peter Hunt made up a number of simpler sets which did get on to the market—the first all-British trade items. Only about a dozen or so were actually completed and were sold by H. J. Nicholls Ltd.

The 1948 Model Engineer Exhibition saw the introduction on a large scale, of commercial R/C gear for models with the unveiling of the Mercury-Cossor transmitter-receiver-actuator units which sold, complete, for the price of £13 4s. 6d. The design was based on a circuit by Peter Hunt, manufactured by A. C. Cossor, the radio people, and factored by Mercury Models. But although it went out in large numbers during the next couple of years or so, it suffered from a number of technical limitations and was far from being reliable enough for general use. Eventually, in fact, the Mercury-Cossor unit was withdrawn from the market, leaving the field virtually open for the E.D. concern, who produced their first set in 1949 and have since gone on from strength to strength, largely due to the experimental and development work of G. Honnest-Redlich.

The E.D. Mark I was a three-valve receiver by Redlich of the single channel audio-tone type, employing Hi-Vac miniature valves. By present day standards it was still quite a large and heavy set, but it did have a measure of reliability previously lacking. The standard servo unit which was supplied with the equipment was clockwork powered, price complete for the whole lot, less batteries, being £14 10s.

A RADIO CONTROL FEATURE

By 1950 it can truthfully be said that interest in R/C model aircraft was really keen. There were probably more people flying—or trying to fly—radio models in this country than there are today. Also the standard of flying achieved with rudder-only control was comparable.

At about this time there was considerable interest in American equipment and American ideas. The lightweight Aerotrol receiver had appeared in the United States designed by Ed. Lorenz, and it employed a thyratron valve (although for 52 megacycle operation). Lightweight American actuators set a standard for simple design, with foolproof operation without the limitations of clockwork mechanisms, and also a number of other ingenious electro-mechanical devices gained temporary favour. Of the latter, probably Herb. Owbridge's Rudevator was best known. An American product, it was manufactured in this country under licence on a limited scale by George Court (who will be better remembered as the designer of the first British production diesel, the Frog) and used with some success by a number of modellers (including a Nationals win by Chuck Doughty).

By and large, however, electro-mechanical gadgets failed to give what was mainly required—reliability—and for multi-controls the only really successful system developed in this country for aircraft use, on a commercial scale, has been the tuned reed receiver, of which E.D.'s are still the only exponents (although J-B Products of Croydon have similar new equipment in hand for early production). The reed receiver seems to have been a parallel, and quite independent, development by Redlich in this country and Rockwell in America in the 1951-52 period. Redlich's commercial efforts have been first with the three-reed receiver with three sub-miniature valves, and more recently a six-reed unit with the same receiver, both of which are current production items.

After E.D.'s entered the field there was a considerable amount of amateur and semi-professional development—radio enthusiasts developing their own equipment, some of which went into production on a limited scale, such as the Ivy receiver, to mention a particularly good example. A trade enthusiast, Steve Fairbrass, originally associated with Redlich, broke away to start production on his own under the name of E.C.C., and after a number of early difficulties subsequently established himself as one of the five current British manufacturers of R/C equipment and second only to E.D.'s in quantity of production. The other three names in the trade are Lines Bros., who launched into the radio market in 1955 with a ready-to-go R/C model cargo boat and are producing their own standard receiver (designed by Somerhoff) in aircraft form; A. T. Sallis of Brighton with a "custom made" unit embracing a single hard valve receiver; and the aforementioned J.B. Products, who are ready to go with their single valve receiver transmitter equipment, virtually continuing the Amco range of R/C gear initiated by that company.

It is probably fair to say that all the single hard valve receivers produced commercially in this country are similar, in basis, to the standard Good brothers' receiver which was originally introduced in America in the mid thirties. The thyratron set, which enjoyed a wave of popularity in the 1950-52 period, has subsequently declined and today the only commercial receiver available of this type is the E.D. Boomerang, which is also put out in a hard valve version, although there have been a number of highly successful amateur thyratron receivers used in baby-size radio models. On the whole, however, the trend with all R/C enthusiasts has been back to the hard valve receiver. This has been reflected in the average size of model used for R/C work.

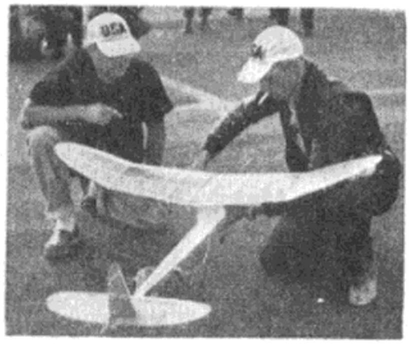
Back in the 1948 and following period the majority of the radio models were large and heavy. Early on, the *Junior* 60 established itself as an ideal "conversion" model, built from a standard F/F kit, boosted structurally as thought fit, and simply fitted with a hinged rudder. The freelance models were generally larger —6 ft. wing span being a common average and spark-ignition motors the general rule at this time. The smaller model came in the lightweight receivers and dwindled in span to as little as 30 in. They proved to be more of a craze than a development, however, and currently a 4-ft. span model is considered a minimum for satisfactory operation, with a 5-ft. model preferred.

During this interim period most enthusiasts returned to rudder-only control for consistent flying, but now the reed receiver is again putting the multi-controlled model on the map, this time with far greater chance of success. And because of the weight penalty involved, model sizes have again tended to increase.

(*Continued on page* 38)

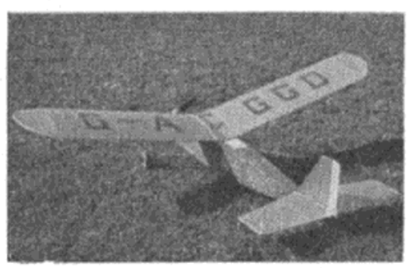
Model Quiz

Test your knowledge of model aircraft matters with this interesting quiz. Score 10 points for each complete answer. A total of 50-60 is fair; 60-70 good; 78-80 very good; over 80 excellent. Answers are on page 43.



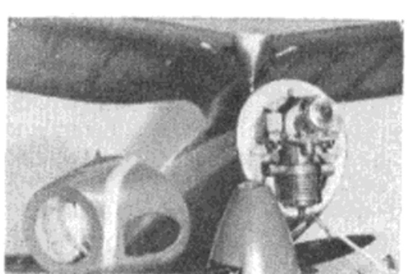
1. Two former World Champions, on this occasion seen in England. Who are they ?
(5 points each correct answer)

2. Wakefield Special:
Name the designers of the following well-known models:
(a) Duster. (c) G.B.3.
(b) Jaguar. (d) Red Swan.
(2½ points each correct answer)



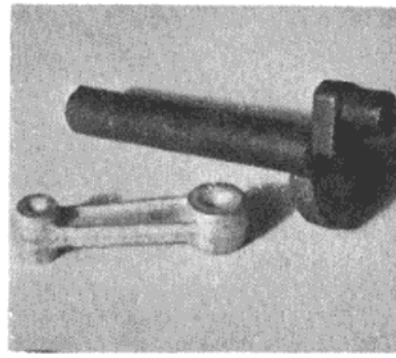
3. Prototypes of Col. Taplin's *Radio Queen* placed 3rd, 4th and 15th in the first British Nationals R/C event. Can you say what year this was ?

4. If you were flying a C/L model weighing 32 oz. at a speed of 75 m.p.h. on 60 ft. control-lines, you would expect the pull on the lines to be approx.:
(a) 6 lb. (c) 18 lb.
(b) 11 lb. (d) 21 lb.



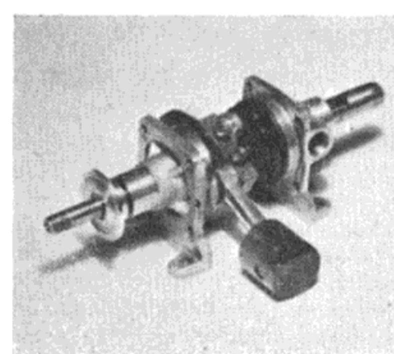
5. Renowned for its excellent construction is this 2.5 c.c. European engine. Can you give:
(a) its name;
(b) the country in which it is made.
(5 points for each correct answer)

6. With which makes of engines would you associate the following designers:
(a) Brebeck. (c) Veenhoven.
(b) Garofali. (d) Miles.
(2½ points each correct answer)



7. In their unfinished state, but easily recognisable, are these two engine parts: a crankshaft and a connecting rod. By which of the following processes was each of them produced ?
(a) Casting. (c) Forging.
(b) Diecasting. (d) Pressing.
(5 points each correct answer)

8. If you increase the number of strands on a rubber motor, keeping the length the same, you would expect the maximum safe turns to
(a) increase;
(b) decrease;
(c) remain the same.



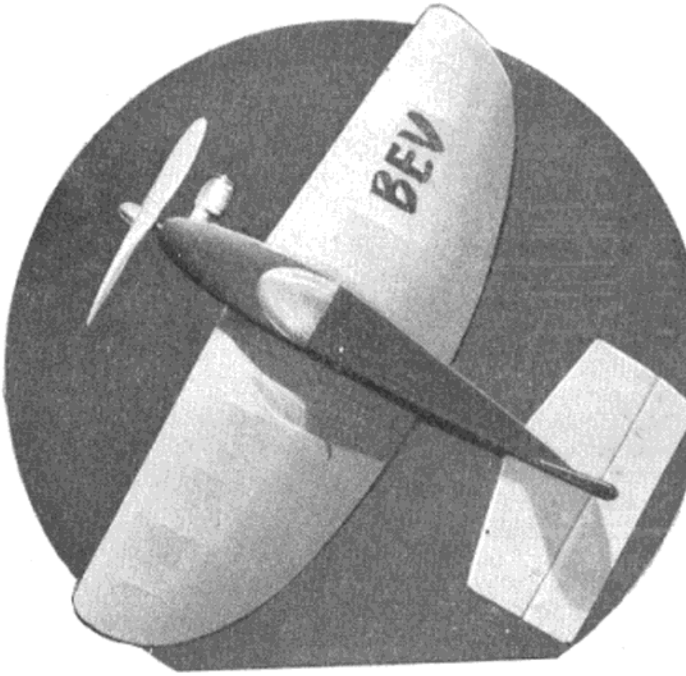
9. These components are from a horizontally opposed twin-cylinder engine. The engine is a
(a) Scout Twin. (c) Super-Wasp.
(b) O.K. Twin. (d) Craftsman Twin.

10. The N.A.C.A. and the N.A.A. are two important American aeronautical bodies familiar to aeromodellers. Can you give their full titles ?

BEV

By TOM NORTON

A STURDY CONTROL LINE TRAILER FOR .75 DIESELS



ITS rugged construction makes this model an ideal C/L trainer, and the Mills 0.75 diesel gives it a lively performance. As a matter of interest *Bev* is the prototype of a series of similar models—all successful—the latest having flaps in addition to elevator control.

Wings

The model's generally unorthodox, though simple, construction makes it necessary for the wings to be built up first. The leading edges are from $\frac{1}{4}$ in. square balsa, gradually tapering to $\frac{1}{8}$ in. at the tips. Now add the ribs, ensuring that the lead-out holes in the port ribs are correctly aligned. Fit bell-crank ply mount between ribs R1. After fixing the crank to the mount, the lead-outs and push rod are soldered in position. Now cover the centre section with $\frac{1}{16}$ sheet. Finally, sand the wing tips to shape and affix the lead weight to the starboard wing as shown.

Fuselage

The entire fuselage is from $\frac{1}{16}$ in. sheet, the sides being pierced at the correct position to receive the one-piece wing. The sides are then cemented to the sheet centre section of the wing. Formers F2 and F3 can be added, with the engine bearers in the correct position. As the air intake on the Mills 0.75 would be half covered by F2, cut out a small square to clear the venturi in both F2 and the fuselage side.

Next, postion the remaining formers and fit the built up wedge-shaped stunt tank. The lower vent passes right through the centre-section and overflows below the fuselage.

Now the tail unit can be assembled, sanded to shape, and cemented to the fuselage. Also at this stage add the remaining fuselage sheeting and the cockpit cover.

At the other end of the fuselage the soft balsa block cowling can now, be cemented lightly in position to hold it while sanding to shape. After sanding, the cowling can be removed and the engine installed before finally recementing in place.

Heavyweight Modelspan is suitable for covering the wing, and lightweight for the fuselage. Alternatively, the latter may be treated with sealer and sanded smooth. If necessary a weight can be added to the rear fuselage to bring the c.g. into the correct position.

A $6\frac{1}{2} \times 7$ in. prop. gives good results and the model flies well on 30-ft. lines.

HOW IT ALL STARTED

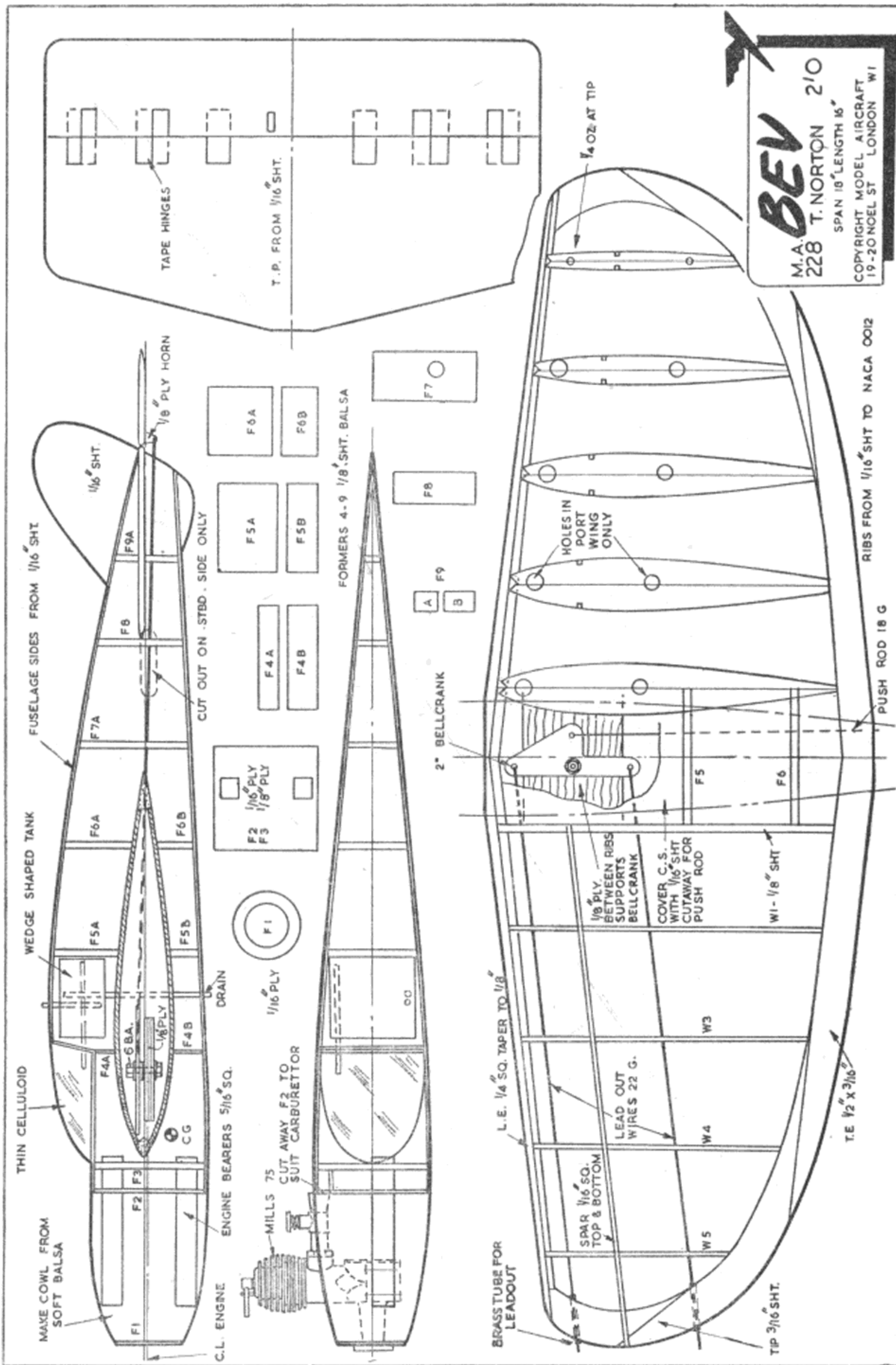
(*Continued from page* 37)

Contemporary with the *Junior* 60 as a standard model for radio flying in this country, Walt. Good's *Rudder Bug* was probably built in equal numbers with, on average, a fair run of success. Its 6-ft. one-piece wing made it awkward to transport, however, and the fuselage would not stand up to a really hard crash. Nor did it have the penetration necessary for all-weather flying in this country. Certainly in British hands, no example ever showed the handling ability which won it top honours in the States.

The *Radio Queen*, a Taplin design, was a venture into the kit market by E.D.'s and this basic design layout has been followed by the E.D. team throughout—with successes far too numerous to require mention. The Veron *Skyskooter* appeared as a simple, lightweight model for lightweight radio, but otherwise kit manufacturers have largely left the radio model well alone. Nor have there been any outstanding freelance designs to start a definite trend, such as de Bolt's *Live Wire* did in America, although there have been quite a number of good individual models.

One of the troubles which has plagued the really small radio model is relay reliability—and the other the availability of a really reliable lightweight actuator which will work on 3 volts. Comparatively few British-made actuators are satisfactory on less then a 4.5 volt battery power, and all are heavier and more bulky than their American counterparts. The clockwork actuator still survives in the E.D. Mark I unit but nearly all the promising precision-type actuators, and particularly the motor-driven variety, have been produced more with the boat modeller in view. There is no simple British-made actuator which compares favourably with the American Bonner, for example; or anything contemporary with de Bolt's motor-driven servos for the aircraft modeller.

The position is somewhat similar to that existing with engines in the immediate post-war years. The modeller who wanted top performance acquired, by one means or another, an American engine. Today, the British engine, size for size, is at least equivalent in performance to its American counterpart, and usually better. But for the best in current production of R/C actuators and servo units, one automatically thinks of American items. How long before the pendulum swings the other way again is a matter for conjecture.

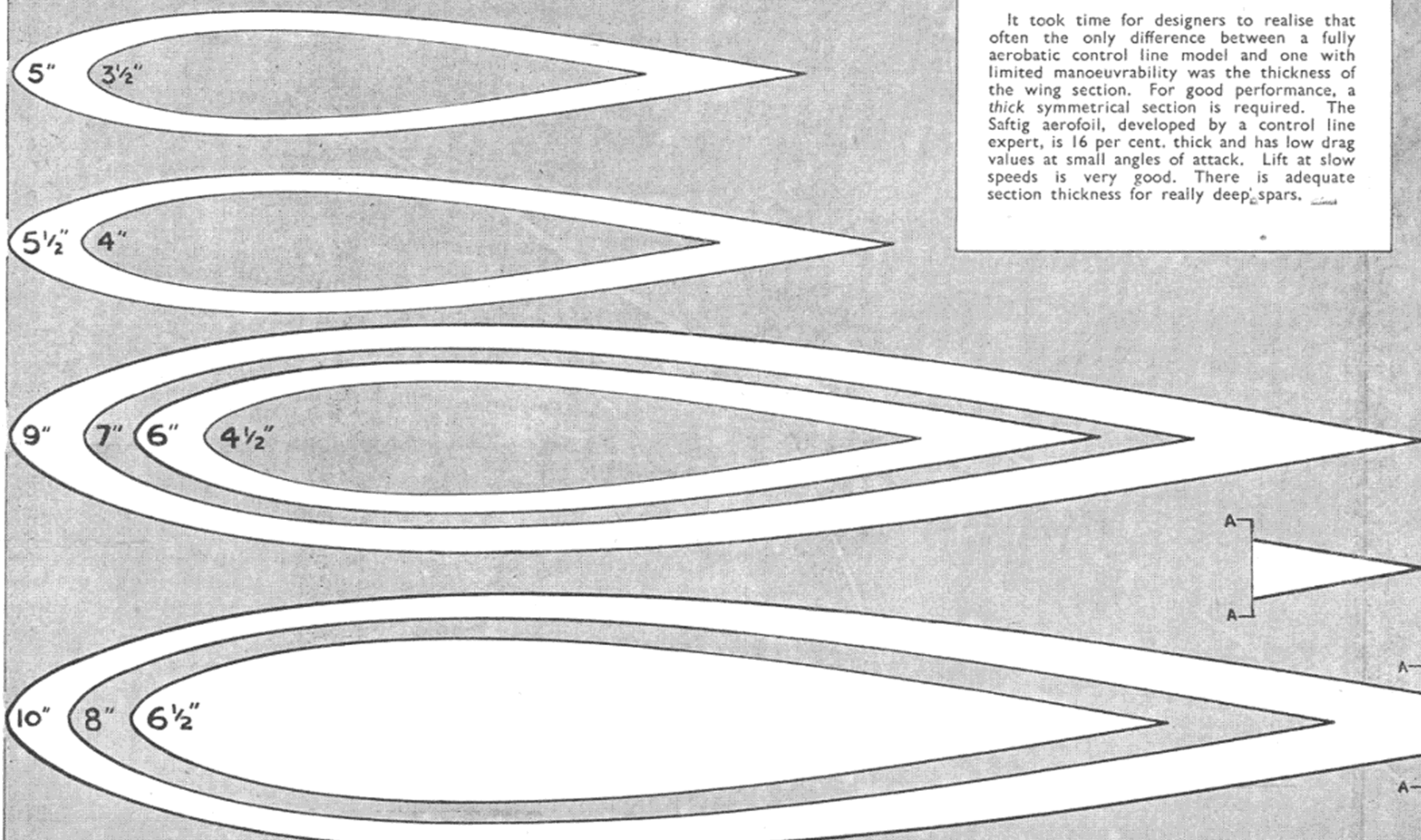


FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 2s. 0d., POST FREE

SAFTIG (STUNT C/L)

It took time for designers to realise that often the only difference between a fully aerobatic control line model and one with limited manoeuvrability was the thickness of the wing section. For good performance, a *thick* symmetrical section is required. The Saftig aerofoil, developed by a control line expert, is 16 per cent. thick and has low drag values at small angles of attack. Lift at slow speeds is very good. There is adequate section thickness for really deep spars.

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



Club News

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

HALIFAX M.A.C.

Our A.G.M. was held in November with a good attendance and the following officers were elected: Len Stott, president; J. Major, chairman; K. Attiwell, secretary; B. Summerscales, treasurer; M. Swanksmith, comp. secretary and A. Nobbs, press secretary.

We have arranged a winter club contest for A/1 of own design with an interim uncovered stage, and we are hoping to stage a film show if we can borrow or hire films of trials, world champions, etc., to use on a 16 mm. projector.

We are also going to invite different experts to give talks on their own particular type of models.

This year we had seven flying in the Wakefield Elim. out of 24.

BRADFORD & LEEDS M.A.C.

Conditions for the A/2 and power elims. at Rufforth could hardly have been worse, but despite this the club turned out in force, with 13 fliers in glider and 10 in power; and we were well among the top placings at the end of the day. Les Hey and Keith Pickles were 6th and 7th, respectively, in the A/2 with 7 : 01 and 7 : 00. In power Messrs. Eggleston (8 : 34) Lanfranchi (8 : 14), and Pannett (6 : 18) placed 1st, 2nd and 4th.

In contrast, when Bradford flew Hull Pegasus in the final of the area knock-out at the same venue the week-end following, the weather was perfect, and some excellent flying was had by all. Sorry to say we lost the contest, due entirely to the pathetic efforts of our glider man (to spare his blushes, he shall be nameless); he aggregated a mere 3 : 52 against his opponents 7 : 54, and Hull were worthy victors by 2 : 51. (However, all were agreed that Arthur Collinson's *Creep* was the highlight of the day; it returned the only perfect score—9 : 00—with ease.)

In October we were treated to the benefits of Silvio's long holiday, in the shape of a wonderful film show in the Leeds club-room; it included shots of this year's model floatplane contests at Milan and the World Championships in Germany, all in colour.

HAYES M.A.C.

We regretfully report that we were beaten by West Middlesex M.F.C. in the final of the L.D.I.C.C.C. by 36 : 49 to 29 : 24. Their win was mainly due to the exceptional performance of their large gliders, although J. Baguley did extremely well for us, with a Nordic, totalling 9 : 07, with two excellent near maximum flights and an unfortunate down-draught. We offer no excuses, they beat us on a clean K.O.

We are pleased, however, to record the efforts of our members in the eliminators; both J. Marshall and J. Baguley having considerable success in the Power and A/2 comps. We were all very pleased to see J. Baguley placed third in the London Area Power eliminator with five three's and 2 : 51 in the fly-off with his v.:.o. model with B.B. 1.49 Elfin. Jim really m de it look too easy.

Our other success was J. Marshall's first place in the London Area A/2 eliminator, with his well-matured (almost vintage) model. J. Baguley, flying very consistently, was placed fifth in this event, with a total of 11 : 34. Extraordinary efforts in model preparation for the three eliminators enabled E. Welbourne to write-off three models, one per comp., attaining a grand total time of 0 : 29 for all three.

We are pleased to see Roy Burrows back in England after his National Service and starting modelling once more. Our club meetings are held in Townfield School, Coldharbour Lane, Hayes, on Wednesday evenings. Prospective members will be welcome and will be sure of an evening's natter on aeromodelling topics, although, unfortunately, no indoor flying is permitted by the authorities.

WHITEFIELD M.A.C.

We have now finished a very busy flying season in which we have done reasonably well. In the Wake Elims. J. O'Donnell topped the club with with 14 : 27 (4th in area) followed by Hughie O'Donnell and John Trainor 14 : 25 and 14 : 00 respectively placing 5th and 6th in area. John O'Donnell lost both models as usual.

In team glider, the club totalled 36: 02, J. O'D. again being top. J. Parrott totalled 9 : 20 in the P. Elims to place 2nd in area and top of club. R. Howarth and J. O'D. both lost a model in this event. Glider times were not very high due to winds and little lift—top time being J. O'D. (10 : 27). Flying has now commenced on our new flying field in Pilsworth, thanks to the farmer who is very co-operative. R. Howarth has flown successfully with an Elfin 1.49 high thrust line job (first in the club), which climbs left or right at random and apparently is stable. Three new club comps. are scheduled for the winter in addition to the usual F/F events. They are combat, speed and a precision comp., in which the aim is to total as near as possible to 5 min. in four flights. Any type of model can be flown.

CLUB REPORTS

About this time of the year many clubs will have elected new press officers to take over the job of "spreading the news" of the club's activities, and at first the new man may not be sure of the best way of preparing a report for the Club News pages of MODEL AIRCRAFT.

The main thing to remember is that a report is published mainly to interest members of *other* clubs, who probably will not know personally the charac ers menti ned. Theref re "family" gags will be lost on the readers. Secondly, the ideal report from our point of view is one that can be sent straight to the printer with no alteration. A glance through the published reports will show the style we want, but here are the features of a good report:

1. About 150-200 words in length.
2. Typewritten, double-spaced, or *clearly* handwritten, preferably on every other line of ruled foolscap. This enables us to make alterations between the lines.
3. One side of the paper only and on reasonable size sheets—please, not on folded sheets of quarto notepaper!
4. Reports go to the printer on the 15*th of the month before* publication. If we receive them after that date they will have to wait until the next issue; if much earlier, they will not be topical.
5. Reports should be written specially for Club News—not sent as a personal letter to the Editor. There is no need to send a covering letter at all; just head the report with the name of the club and it will be obvious what it is. While we like to see club and area news-sheets, they are rarely suitable for reports and need a great deal of time spent on sorting out and re-writing.
6. Above all, we want *news*, not lists of contest results with their rows of flight times that mean little to anyone outside the club. And if nothing noteworthy has happened recently, it is a waste of time to write: "Bad weather has held up club flying this month but the boys are busy building and Joe Blank has nearly finished his 1953 Wakefield." This is not news, so give it a miss this month and wait until something interesting happens.
7. Finally, if you are electing a P.R.O., pick one who speaks English, and can spell too—remember "deisle" is spelt *diesel.* And not too much slang, please, or too many queer abbreviations.

A "Le Mans" start to a thirty-minute club scramble organised by the Swindon M.A.C. at Wroughton Aerodrome.

HEANOR & DISTRICT M.A.C.

We have been busy with our club trophies recently. Doug Froggart won the Open power trophy, a shield presented by Ken Smith our chairman. The class " A " team race trophy was won by Lewis Whitworth, who also saw the class " B " trophy slip from his grasp when his " Pacer " failed to start.

A one night building contest is planned in conjunction with the local model shop. Competitors stand the price of the kit if anything goes wrong. Points are to be awarded for time, finish and cleanliness.

A trip to the Loughborough rally was organised and well supported. More of these local winter rallies please ! Plans for our own contest on January 8th are going ahead.

We are looking for a local club room large enough for r.t.p. and somewhere for our junior members to have at least one night of building a week.

We at Heanor take this opportunity to wish all aeromodellers everywhere a Happy New Year.

LOUGHBOROUGH COLLEGE M.A.C.

Loughborough College Winter Rally results

Team Race " A "
1st L. Whitworth, Heanor.
2nd D. Crofts, Burton-on-Trent.

Combat
1st M. Ulyatt, Gamstom.
2nd P. Brotherwood, Zenith.

Glider
1st C. Wiggings, Warwick.
2nd R. Monks, Birmingham

Power
1st P. Ricues, Rugby.
2nd F. Adcock, Zenith.

Rubber
1st S. Wade, Loughborough.
2nd M. Canham, Leicester.

Sports Precision
1st, D. Siddal.

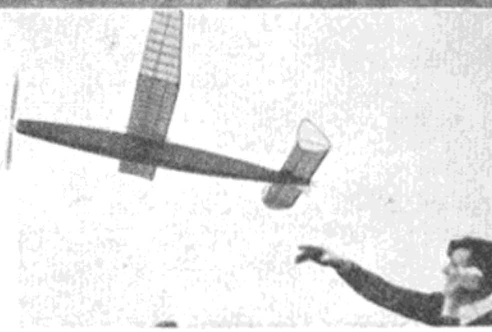
There was a total of 66 entries from no less than 16 clubs in this first rally organised by the college.

BRIGHTON D.M.A.C.

In October we held our annual seaplane contest for the Chairman's Cup at a pond near Ditchling Beacon. The weather was dull and misty, with little wind, which made take-off difficult for the power entries, as the sides of the pond's bowl rise steeply from the water's edge. The contest attracted six entrants and there was a keen struggle between the rubber and power fans. Eventually both Reg Boxall, flying a Wakefield, and Ian Lucas, flying an Elfin 149 powered *Clot II*, tied with triple max's and in the gathering gloom Ian won the fly-off by the narrow margin of 5 sec., both models going o.o.s.

As a result of this contest the final position for the club championship was 1st: Reg Boxall, 21 pts.; 2nd: Fred Boxall and Ian Lucas, 14 pts.; 4th Peter Brown, 8 pts.

For the fifth successive year we have carried off the area championship and, having won the original Championship Cup outright, we now have two notches towards the second. Apparently, we scored over twice the score of the runners up. Fred Boxall won the area individual championship.



Left: J. Wassel (Hayes) and his rubber job part company. Top right : P. Law launches Laurie Barr's " Thunder King" (W. Middlesex). Below: W. Middlesex team member M. Whippey releases his large rubber job.

L.D.I.C.C. FINAL ROUND

The London and District Inter-Club Competition is held annually as a series of eliminations between pairs of clubs; the whole being arranged by the London Area of the S.M.A.E. The rules are simple: two rubber and two glider representatives per club with 3-4 min. maximums to aim for; the club with the top aggregate moving into the next elimination.

Hayes D.M.A C. met West Middlesex M.F.C., for this, the Final, and an early morning drizzle soon cleared, leaving a fine but crisp day.

West Middlesex busied themselves with selecting a glider team from a choice of models, as Hayes knocked up a score, and showed themselves to be experts at tow-line technique. Both rubber teams were a disappointment, and it was the glider teams that really set the pace. Each model was in excellent trim and West Middlesex gradually drew ahead. This was no reflection on Hayes because their A/2s, good as they were, could not get the edge on their considerably larger opponents, with wing areas of about 900 sq. in.

J. Baguley of Hayes, with his A/2, came very near to upsetting theories on " scale effect," and but for his last flight, which began and ended in the father of all downdraughts, would probably have topped the glider scores. The performance of his model was through no accident of design.

For West Middlesex, L. Barr showed up best, flying his well-worn but formidable ⅜ scale *Thunder King*, which, as always, appeared to have a thermal-sniffing technique of its own.

Although on this occasion W. Middlesex won, Hayes put up some stiff competition, and a return " friendly " contest is being arranged for the coming winter months.

RESULTS

Hayes. Rubber: P. Hedgeman, 8 : 36; J. Wassel, 6 : 21. Glider: J. Baguley, 9 : 07; E. Welbourne, 5 : 20. Total: 29 : 24.

W. Middlesex. Rubber: M. Whippey, 8 : 24; T. Over, 7 : 49. Glider: L. Barr, 10 : 40; G. Martin, 9 : 56. Total: 36 : 49.

Bidding for a place in the British team is A. R. Peppitt (Ilminster) flying in the first round of the 1956 Eliminators.

CROYDON & D.M.A.C.

Croydon have retained the Plugge Cup again, by a disqualification due to a certain north-western area competition secretary. To the salt mines, lad and condolences to Whitefield ! Still, think of the dusting you won't have to do !

Margaret Revelle put her Palmer-influenced A/2 up the tallest tree in Chobham's famous clump, and research is now going on into tree climbing technique. Does anyone have any practical suggestions ?

The club open glider contest was held recently at Epsom in dull misty conditions. As the lads were packing up to go home, John Blount rolled up and put his *Nebula* up for 8 : 31 to beat John Palmer into second place. And lo, the drinks were on Blount !

SUNDERLAND & DISTRICT M.A.C.

At the time of our annual general meeting we have 26 fully paid senior members. Interest lies mainly in C/L and sport power flying.

Due to the fact that our official flying field is closed to us before 5 p.m. and that it is used by the A.T.C. glider and Newcastle Gliding Club, we fly off Newcastle Town Moor and Temple Park, South Shields as well as many more local plots of waste ground.

We are planning, in the near future, to hold indoor jetex, r.t.p. and rubber powered team race in our club room. We hold meetings the first Friday of every month in our club room at the Workmen's Club, Harbour View, Sunderland, and anyone interested is invited to join us.

WEST MIDDLESEX M.F.C.

Our recently held club glider competition did not produce the times expected, the only model in excellent trim was H. Hubble's A/2; the remainder of us, equipped with A/3s, came to the conclusion that hours of patience are required to bring out of a model that little extra something. However, the conditions were as near as possible still-air, and G. Martin, with 900 sq. in. of wing area to play with, bagged the cup.

Soon we should be equipped with seven A/3s and ready to do battle with allcomers.

Anyone interested in joining the club should make a bee-line for Greenford Community Centre, Oldfield Lane, Greenford, during Friday evenings, in particular rubber and power fiends.

SOUTHAMPTON M.A.C.

The southern area meeting at Larkhill near Salisbury was well supported by A/2 and power enthusiasts for the first of the 1956 Eliminators.

On arrival the contestants found a bright, but cold day before them with a strong north-west wind. The weather later became worse, with a threat of rain, which made flying difficult. J. Manville of Bournmouth was the winner of both A/2 and power events.

During the contest we saw many superb models of which an A/2 by Mr. Herdies of Bournemouth deserves special mention.

SIDMOUTH M.S.

At out annual meeting a satisfactory report was given of our activities during the past season. The flying members in particular had a good season, and glider members are going over to R/C, which should be in action next season. The club needs more members and anyone in the district who is interested will be welcome. Please get in touch with the Hon. Secretary, J. E. Sleight, Myrtle House, High Street, Sidmouth, Devon, or come along to the club room, High Street, Sidmouth, on any Wednesday evening at 7.30.

FORESTERS (Nottingham) M.F.C.

The Foresters team-race circus took a day off in November to run the class "A" race and combat at the Loughborough College M.A.C. rally. As a result of intensive processing, two thirds of the entries needed modifications, one stalwart building a new tank on the field. In an exciting "A" final, Heanor came off best in 11 min. The combat final was short and sweet, with "Pit-boot" Harry Ulyatt out-pranging "Jimpy" Brotherwood, both of our fledgling club, the Gamston Streamer Slashers.

The "boys" thought Geoff Pike was joking when he claimed his radio mod. had lost control of his transmitter, but the sight of Geoff in hot pursuit soon convinced them. The model was retrieved from a chimney stack, both slightly the worse for wear.

QUIZ ANSWERS

1. Joe Foster and Dave Kneeland. Respective winners of the Wakefield and FAI Power events at Cranfield, 1953. 2. (a) Joe Bilgri; (b) Ted Evans; (c) Bob Copland; (d) Henry Tubbs. 3. 1949. 4. (b) 11 lb. 5. (a) David-Andersen Diesel; (b) Norway. 6. (a) O.K. Cub; (b) Super-Tigre; (c) Typhoon; (d) E.D. 7. (c) Both are forgings. 8. (b) Decrease. 9. (d) Craftsman Twin. 10. The National Advisory Committee for Aeronautics and the National Aeronautic Association.

FARNBOROUGH M.A.C.

Many new members have joined us this year, bringing our numbers up to 40. Many of these are keen juniors who, in two or three years' time, will have enough experience to keep the club in the limelight, where competition flying is concerned. To give the juniors a fair say in club matters, one of their number has been elected to the committee. Duncan Sibbick is this junior committee member, and is setting a fine example to the youngsters of the club by competing strongly (with his o/d models) against the seniors in club contests.

Don Gordon, our comp. sec., is flying his highly modified *Marauder* to good effect. Don's model sports a fuselage of experimental design which was not in the least bit damaged after a 100 ft. vertical dive, when the nose buried itself 2 in. in the ground.

Jim Whiting has once again got to re-cover his *Eliminator*, which seems to find a hostile tree nearly every time out. Powered by an Elfin 1.49 this model is proving real "hot stuff."

Members are itching to see Barrie Bloomfield's *Radio Queen* take the air, only bind being the lack of a suitable flying field.

After several months of wishful thinking, club secretary John Webster has finally given up all hope of recovering his Javelin-powered *Zing*, which disappeared after 5 : 30 on his last Keil Trophy flight at Chobham. Sabotage to the D.T. fuse by rain is suspected.

NEW CLUB

A model aero club has just been formed at Bifrons Youth Centre, Barking, on Wednesday evenings at 7.30 with full workshop facilities. Any keen modellers living in the district, whether they are interested in sport, contest flying, F/F or C/L, would be cordially welcomed. Minimum age is 14 with no upper age limit. Annual subscription is 6s. for under 17 and 12s. 6d. for those over, entitling member to take part in any of the centre's numerous activities, which include motor cycling, mathematics, dancing, etc.

The club is under the direction of Mr. Jack Holt, winner of the Thurston Cup (Nationals) 1953, designer of *Corsair*, *Five Minute Lightweight* and *Hyperion*.

AEROBODS OF NOTE

MAJOR TAYLOR

A well-known figure at all the big contests. Puts in an immense amount of work behind the scenes, as the Competition Secretary of the S.M.A.E.

LECTURER WANTED

Northwick Park M.A.C. would be pleased to hear from any knowledgeable readers of MODEL AIRCRAFT able and willing to give interesting lecturers to their club members, during next March. Any model aircraft subject—except solids—would be welcomed, and anyone interested should contact Mr. E. Rowntree, 36, Pinner Park Avenue, Harrow, Middlesex.

SECRETARIAL CHANGES

Norwich M.A.C. K. E. Nash, 33, Magdalen Road, Norwich, Norfolk.

Selby M.F.C. M. Firth, 10, Staynor Avenue, Selby, Yorkshire.

Monkspath M.A.C. R. Nailer, 9, Slater Road, Bentley Heath, Knowle, Nr. Birmingham.

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