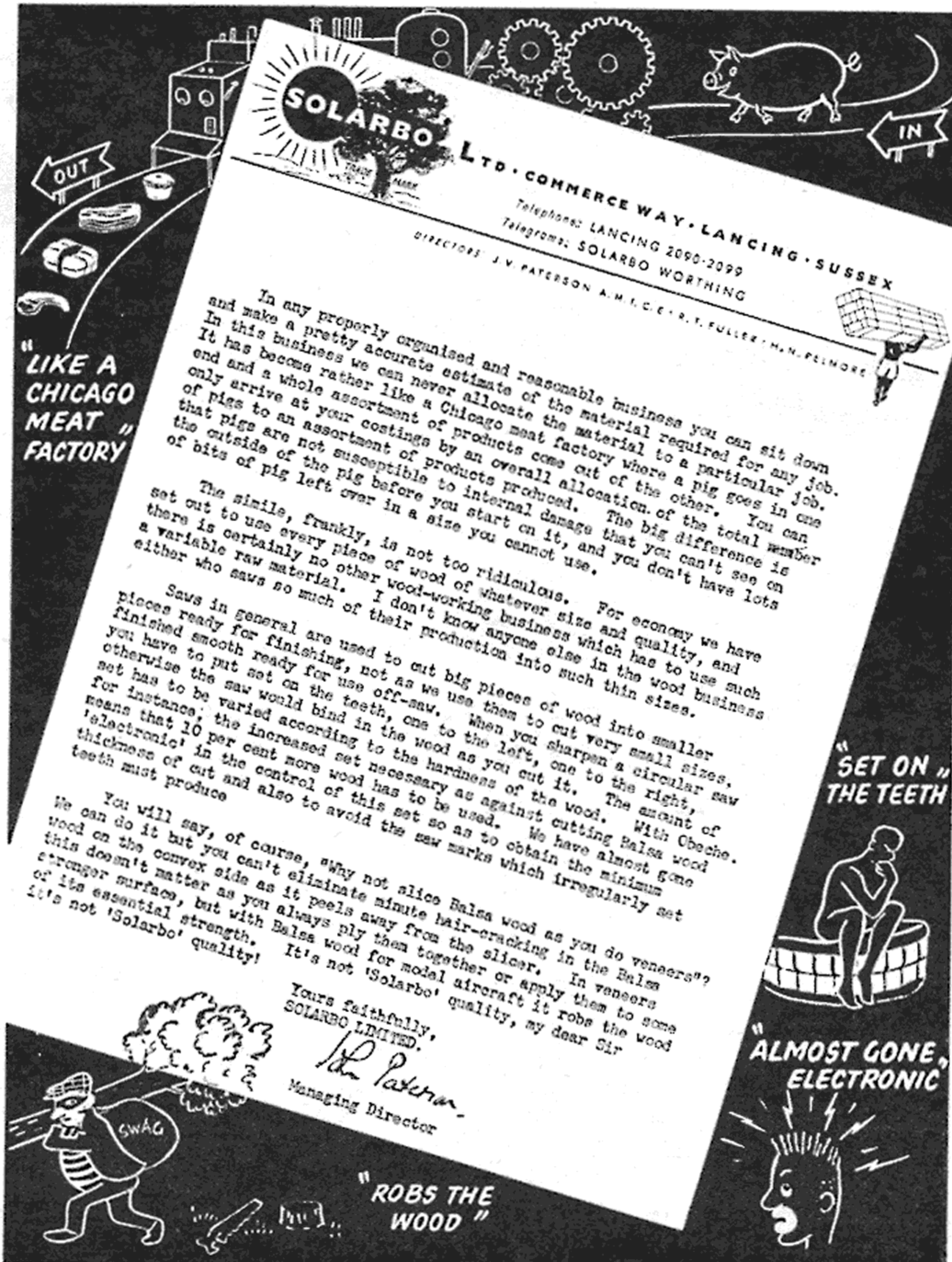
MODEL AIRCRAFT

JUNE 1955

The Mustang —SCALE PLANS INSIDE

1'6



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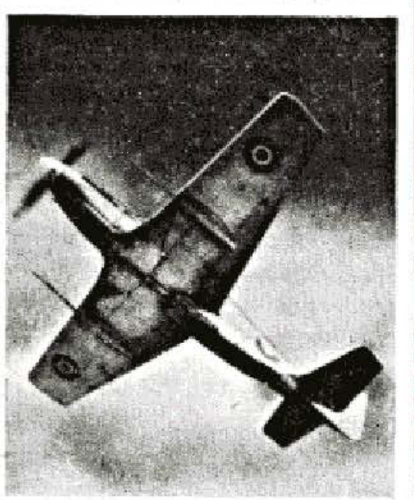
JUNE 1955 No. 168 VOL. 14

Contents

Cover Story

With the increasing interest of solid modellers in older aircraft—especially World War II vintage—we have chosen the North American *Mustang* for our 1/72 scale plan this month. This ubiquitous aeroplane appeared in so many guises that it would be impossible, in the scope of one article, to list all the variants in detail. Consequently we have tried to present a background history of the *Mustang* rather than attempt the impossible.

Our cover picture shows an experimental version fitted with tank-busting cannon beneath the wings.



THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

More on Metallised Paper

DEAR SIR,—After seeing comments on metallised paper covering in MODEL AIRCRAFT recently, I have felt prompted to offer some suggestions on the subject. As one of the instigators of metallised wallpaper covering of model aircraft, I feel qualified to write on the subject. I have heard it said by many people that it is not possible to cover small models with this paper, and that models with clean lines must be chosen. I want to quell any fears that modellers may have on the inability to cover a model with this material, I assure them that with practice and patience, the most complicated models can be covered and the result is most attractive.

I use aluminium wallpaper, manufactured by Sanderson's Wallpapers Ltd. This is 3 thou in thickness (1½ thou paper and 1½ thou metal). The best way to apply it to a model is with "Evo-stik" cement, as used for sticking Formica, obtainable from large hardware stores. The solvent for this is acetone obtainable at chemists. If the model is balsa it is best to give the usual sanding sealer coats to obtain a good surface. Then, and in particular if the balsa wood is soft, it should be covered with rag tissue and clear dope. This gives a hard crust ready to take the metal. This is particularly neccessary on models with complicated shapes, as they require a considerable amount of rubbing. Panels should be kept small, the glue applied to the surface of the model thinly and evenly (clear dope is also suitable as a glue) and the metal is then laid on and rubbed down with a soft piece of linen. Double curvatures such as jet noses, intakes, wing tips, and other difficult portions, should be covered with a piece of metal paper slightly larger than the actual panel required and worked round and over the surface with the handle of an old toothbrush.

On other suitably hard and polished objects, rubbing this over the metal stretches and smooths it to the required shape—in fact does the same thing as boning in leather work. When a suitable portion of the metal has been shaped the wrinkled edges can be trimmed away with a razor blade leaving only the smooth panel. Then the next panel is fitted in the same manner, and so on, until the whole model is covered.

I have seen the jet intakes on a 1/144 scale solid model of a *Comet* covered in this way, and it was beautifully done. I am sure that anyone trying this method

(*Continued on page* 248)

TRIALS AND TRIBULATIONS

THAT the "trials" are to be held at Odiham Royal Air Force Aerodrome, in Hampshire, is a further indication of the serious nature of the flying field situation. There is, as was perhaps inevitable, some criticism of the venue as being insufficiently central, but the situation is now such that there is rarely a choice of flying grounds available.

The Nationals, too, are to be held on an R.A.F. Aerodrome, as in past years, at Waterbeach, Cambridge. As the co-operation of the R.A.F. is essential at the present time to enable the S.M.A.E. to arrange the bigger meetings, it is as well to underline that modellers attending meetings such as the Nationals are guests of the R.A.F. whilst on the aerodrome, and that their conduct should be exemplary. Incidents, similar to those ill-mannered acts of vandalism that occurred last year at Waterbeach must be prevented if the co-operation of the R.A.F. is to continue. It is up to the more responsible members of the model flying community to do their best to control, and if necessary report, the minority of hooligans who, by spurning the goodwill of the R.A.F. and thus losing the use of the flying grounds can ultimately injure the model flying movement.

It is also up to all to co-operate to reduce, indeed eliminate, litter—one of the most pernicious problems connected with outdoor meetings.

News from Mexico

IN a recent letter from Mexico, Phil Guilmant, well-known British A2 flier, gave us a pen picture of the modelling scene in the land of sunshine and sombreros.

Although, as Phil says, Mexico has not yet made any impression in international events, there is every likelihood of her modellers doing so in the future. The inherent craftsmanship of the Mexican people is an acknowledged fact, and Phil says that those modellers who build seriously achieve a finish that is far superior to that generally seen in this country, together with a matching performance.

America is the chief source of supply for materials owing to the prevailing import restrictions but certain components eventually will be manufactured in Mexico.

As in so many countries abroad, altitude presents a considerable problem to Mexican modellers and many of the large towns—and therefore the clubs—are on the Mexican Plateau, which covers thousands of square miles at altitudes varying from 2,000 to 7,000 ft. Consequently starting motors at such altitudes is no easy task and very few diesels are used for that reason. Sluggishness is apparent in flight, too, and a further hazard is the downward thermals!

Power models predominate and very few rubber and glider models are built. R/C is also popular among the Mexico City modellers.

Decentralised Finance

THE innovation this year of a pre-entry system for the decentralised comps is proving to be a sound move. From the first d/c competitions—the Gamage and Pilcher Trophies—a useful increase in fees over those collected for the same meetings last year have accrued, thus making the overall financial picture better.

Coupled with the success of the new membership scheme the S.M.A.E. will, this year, be able to realise the proposals made when the scheme was put into force; that they would be able to be self-supporting financially.

Consequently, the council have decided to make no appeal for individual contributions to a fund to send competing teams abroad this year.

AERODROME IN MINIATURE

The airport in the miniature city of Madurodam, The Hague, Holland. Crowds throng this model makers' paradise all through the summer; proceeds go to a sanatorium.

WE regret to report the sudden death of Sid Allen, well-known R/C flier, on April 17th. Sid had been admitted to Battersea Hospital with pneumonia, and was well on the way to recovery, when he died after a sudden heart attack.

His whole interests, professional and leisure, were devoted to aeromodelling and for the past two years he had been on the staff of Electronic Developments (Surrey) Ltd.

Sid was in his 44th year and we offer our condolences to his family in their sad loss.

ROYAL PATRONAGE FOR S.M.A.E.

HIS Royal Highness, the Duke of Edinburgh, has extended his patronage to the S.M.A.E. He made this known in a message to Colonel R. L. Preston, Secretary-General of the Royal Aero Club. This is indeed an honour for the Society and one which will greatly enhance its prestige.

The Duke's forthrightness in all his relations with other organisations enjoying his patronage is well known, and we may now expect him to take a considerable interest in model flying activities. Certainly he does not confer this honour lightly, and it is an indication of his enthusiasm for all things aeronautical and the promotion of airmindedness among the youth of this country.

The Duke qualified for his R.A.F. wings and now often pilots his own aircraft. In May, 1953, he made history by flying by helicopter from the grounds of Buckingham Palace to Pirbright.

His interest in modelling was apparent when he opened the "Model Engineer" Exhibition in 1952, and he spent over an hour touring the exhibition asking pertinent questions of his guides.

World Championships

AT a recent meeting of the S.M.A.E. council it was decided to send a team of four members and a team manager to the World C/L speed championships. The team, pictured on the right, will be accompanied by D. A. Gordon as team manager. The meeting, it seems, will now be held in conjunction with the Air Festival at Poitiers, which is being held primarily to select the French teams to compete in the soaring and parachuting championship next year. The meeting, which will take place between June 26th and July 10th, will include international matches in these events besides the World C/L championships (probably July 1st to 3rd), and an exhibition of light aircraft.

It was also decided at the same council meeting to send three teams of four and one team manager to the World Championships for power, Wakefield and A2 models.

Exhibition Posters

POSTERS for the forthcoming "Model Engineer" Exhibition will be available during July for display. Clubs and club members who would be willing to exhibit a poster should write to the Exhibition Manager, 19-20, Noel Street, London, W.1.

P. Wright. M. G. Smith. R. Edmunds.

THE SPEED TEAM

FOR THE WORLD CHAMPIONSHIPS

Left: D. Woods launches Pete Wright's model.

ON April 17th, at Radlett Aerodrome, the elimination trials were held to decide the team that will represent Gt. Britain at this year's World Championships. Our congratulations to the following, who placed highest in the 2.5 c.c. class and will comprise the team:

P. Wright (St. Albans M.A.C.), 90.9 m.p.h.
M. Smith (High Wycombe M.A.C.), 87.4 m.p.h.
D. Woods (St. Albans M.A.C.), 83.8 m.p.h.
R. Edmunds, (High Wycombe M.A.C.), 83.8 m.p.h.

The Bearcat

A SUPER-SCALE CONTROL-LINE MODEL OF A U.S. NAVY FIGHTER FOR 1·5 c.c. ENGINES

by P. M. H. LEWIS

THE last of the distinctive line of piston-engined Grumman fighters produced for the U.S. Navy, the *Bearcat* first appeared in 1945, and although no longer in front line service, it equips a number of U.S. reserve units. Powered by a 2,500 h.p. Pratt & Whitney R-2800-34W engine, the *Bearcat* has a maximum speed of 425 m.p.h. and a range of 1,650 miles.

This 1.5 c.c. Allbon Javelin-powered model is of an F8F-2 from the station at Glenview, Chicago, Illinois.

Fuselage

The crutch is the component about which the fuselage construction is centred, so it is the first item to be cut from $\frac{1}{8}$ in. sheet. Slots are made for the push-rod and for the $\frac{1}{2} \times \frac{3}{8}$ in. hardwood bearers, which are cemented in place after the 14-g. wire undercarriage has been bound and glued to them. Former F1 is cut from $\frac{1}{16}$ in. plywood, while F2-F10 inclusive are of 3/32 in. sheet. Pin and glue F1 to the front of the bearers and cement the formers to the crutch. The 3/32 in. sheet tailplane supports and the $\frac{1}{8}$ in. sheet tailwheel mounting, complete with $\frac{1}{2}$ in. wooden tailwheel on 18-g. wire axle, are next fitted. The tank is located between F2 and F3. Fit the aluminium or paxolin control plate with an 8-B.A. nut and bolt to its cross-piece of $\frac{1}{2} \times \frac{1}{2}$ in. hardwood. This in turn is pinned and glued to the main bearers. Three-sixteenth in. sheet is used for the tailplane, which is the next part to join the crutch, followed by the fin of the same material and a dorsal fin of $\frac{1}{8}$ in. sheet.

Planking of the fuselage with $\frac{1}{4} \times 3/32$ in. strips follows, the upper half being treated first between formers F2 and F10. The push-rod of 18-g. wire is cut and threaded through the openings in the formers, to be secured to the control plate at one end with a soldered washer, and at the other to the elevator hinge of 20-g. wire in the same way. Twenty-four g. leadout wires are also fitted before the completion of the planking. Slots are left on the port side for free movement of the wires.

The fixed lower part of the cowling is made from hollowed out soft block, and so also is the detachable upper portion. Press studs are sewn and cemented to keep the latter in place. Three $\frac{1}{8}$ in. sheet laminations form the front cowling ring. Between F2 and F3 there is an inset panel of 3/32 in. sheet, aft of the exhaust stubs, which are later fitted from neoprene tubing. Note also the downthrust which is a noticeable feature of the full-size *Bearcat*. Soft block fairs the rear of the fuselage, the whole of which is sanded before cementing the two $\frac{1}{8}$ in. sheet ventral fins in position.

Wing

The leading edge of $\frac{1}{8} \times \frac{3}{8}$ in. and the trailing edge of $\frac{3}{4} \times \frac{1}{16}$ in. sheet are pinned to the plan and ribs R1-R6 of 3/32 in. sheet cemented in place. Cut-outs for the 24-g. wires are needed only on the port side. Wing tips are of soft block with 16-g. tubing on the port side and a lead balance weight on the starboard. When set, remove the wing halves from the drawing and cover them with $\frac{1}{16}$ in. soft sheet, the grain running spanwise. Root intakes are formed from soft block with slot openings cut in the faces. Slots are cut in the lower surfaces to accommodate the undercarriage legs and are covered again when the wings are fitted. The wing halves are sanded and pre-cemented at the root ribs, before being placed in position on the fuselage with $1\frac{1}{2}$ in. dihedral at the tips.

Rudder and Elevators

These items are next cut from $\frac{3}{16}$ in. sheet and sanded to shape. The rudder is attached to the fin with two inset aluminium hinges and the elevators are pressed and cemented on to their wire hinges.

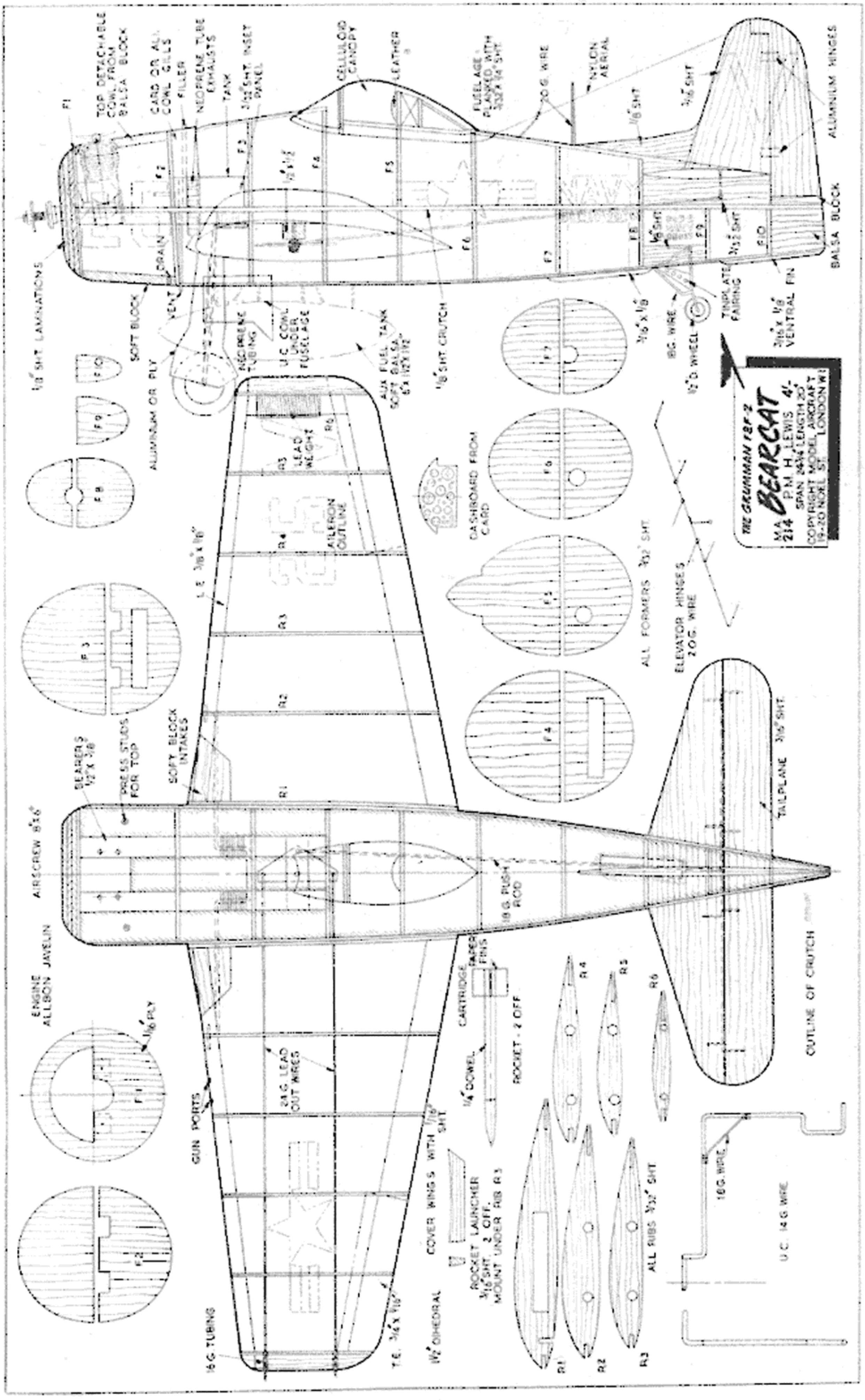
Covering and Finish

The entire model is covered with Jap silk or heavy weight tissue after it has been filled with sanding sealer and rubbed down to the smoothest possible finish. Several coats of midnight blue dope are applied, wet sanding with soap and water being used after the first two applications. The finish is then further improved with polish applied with a soft cloth.

Details

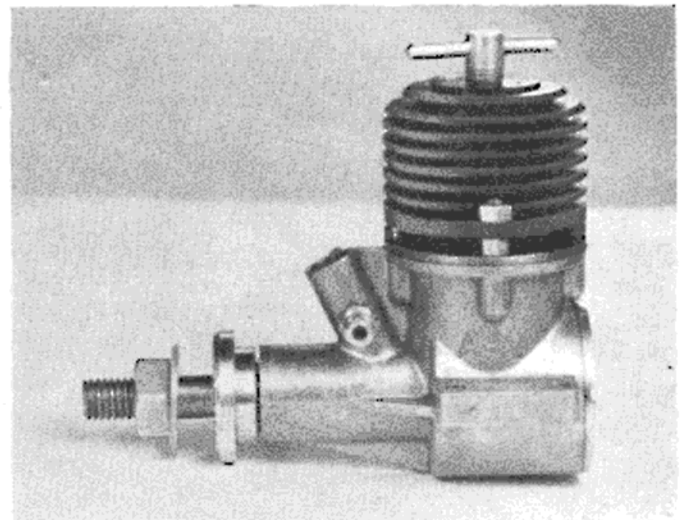
The dashboard is drawn on card with Indian ink and glued to F4. The headrest is cut from leather and

(*Continued on page* 224)



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

MA Engine Tests



No. 74. The A-M. 2·35 c.c. diesel

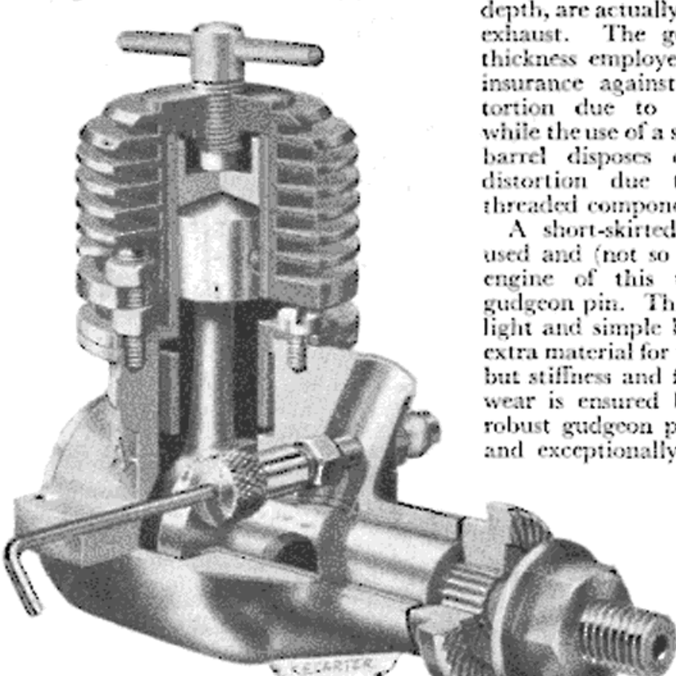
INTRODUCED towards the end of the 1954 season, the Allen-Mercury "25" now appears with minor modifications and improvements for 1955. Designed and manufactured by Allen Engineering of Edmonton, Middlesex, the A-M 25 is the product of a practical model builder (Dennis Allen) and it is apparent that efforts have been directed towards evolving a moderately priced unit of good output and suited to a wide variety of model aircraft applications. While no record breaking performances are likely to be claimed in pure speed work, it would be true to say that this engine is suitable for practically all other types of models, both C/L and F/F.

In general, the A-M 25 is of conventional design and is of the shaft valve, radial port layout. The unit is assembled around a well executed light alloy die casting forming the crankcase and main bearing housing. A mechanite main bearing bush is used and in this, the crankshaft journal was an exceptionally good fit in two test engines examined. The crankshaft is a robust component, with plain disc web and is casehardened. The front end of the shaft is reduced to $\frac{1}{4}$ in. diameter for the airscrew hub and is $\frac{3}{8}$ in. long—adequate for safely accommodating all propeller pitches.

The cylinder is machined from mechanite and has a wide flange below the exhaust ports which locates and secures the liner in the main casting. The latter has an internal diameter of 25/32 in., while the cylinder liner has an outside diameter of 23/32 in., thus leaving a 1/32 in. wide annular transfer passage. The cylinder wall thickness is nearly 5/64 in. at this point, but decreases to approximately $\frac{1}{16}$ in. above the exhaust ports.

An unusual feature emerging from this cylinder design is the fact that the transfer ports are slightly wider than the exhaust ports and, being of identical depth, are actually of larger area than the exhaust. The generous cylinder wall thickness employed should be adequate insurance against risk of thermal distortion due to localised overheating, while the use of a slide-on finned cylinder barrel disposes of any possibility of distortion due to radial loading of threaded components.

A short-skirted mechanite piston is used and (not so frequently seen on an engine of this type) a full floating gudgeon pin. This piston has been kept light and simple by omitting to provide extra material for the gudgeon pin bosses, but stiffness and freedom from excessive wear is ensured by the use of a fairly robust gudgeon pin (5/32 in. diameter) and exceptionally well fitted small end bearings. The big-end bearing of the well made connecting rod is likewise a very good fit.



This cut-away drawing shows the unusual method of attaching the cylinder barrel and cylinder to the crankcase.

A paper gasket is used to make the joint between the cylinder liner flange and crankcase and the former component is secured by two screws and two special studs screwing into lugs in the latter. These studs have 8 B.A. hexagon flats, a 6 B.A. threaded portion being extended upward through holes in the base of the duralumin cylinder barrel, which latter is then held down by hexagon nuts. A point worth noting in connection with the barrel is the exceptionally good fit of the compression screw threads.

The A-M 25 is compact and well proportioned to fit most contemporary model designs calling for 2.5 c.c. units. It is of moderate weight, yet of sufficiently robust construction to withstand the usual rigours of model flying, both expert and inexpert.

Specification

Type: Single-cylinder, air-cooled, two-stroke cycle compression-ignition. Shaft type rotary valve induction with sub-piston supplementary air induction. Radial exhaust and transfer porting with conical top piston.

Swept Volume: 2.352 c.c. (.1435 cu. in.).

Bore: .570 in. Stroke: .5625 in.

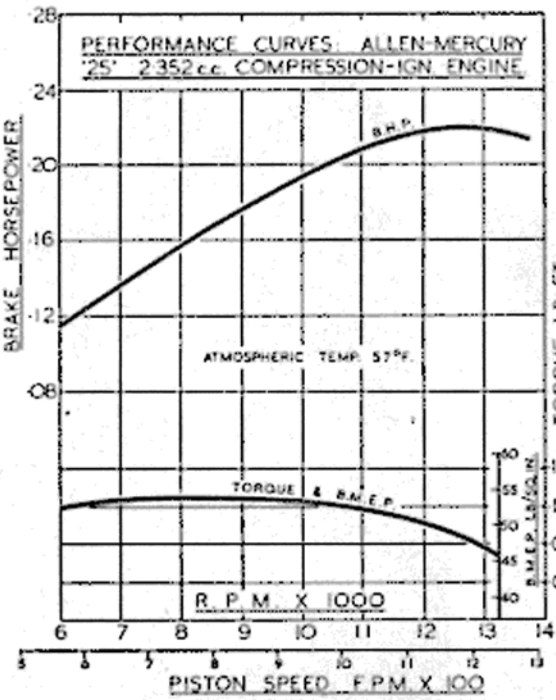
Compression Ratio: variable.

Stroke/Bore Ratio: .987 : 1.

Weight: 4.0 oz.

General Structural Data

Diecast LM.2 aluminium alloy crankcase with integral main bearing housing, carburettor intake and beam mounting lugs. Screw-in rear cover. Crankshaft of S.14 steel, case hardened and running in mechanite iron bushed main bearing. Cylinder of mechanite, attached to crankcase with two screws and two studs. Piston and contra-piston of mechanite. Duralumin connecting rod. Duralumin propeller-driver, pressed on to splined crankshaft section. Duralumin finned cylinder barrel, colour-anodised



black. Duralumin spray-bar assembly.

Test Engine Data

Total time logged prior to test: 2 hours.
Fuels used:
(a) Mercury No. 8 (castor base).
(b) Mercury RD. (castor base).

Performance

Although the instruction leaflet calls for priming the engine with raw fuel both on the piston and in the air intake, we found that the test unit would start quite readily with finger choking only. The starting characteristics of the A-M 25 can be likened to those of another engine to which the A-M bears some outward, resemblance: the original type Amco 3.5. This is especially noticeable, we found, when the engine is loaded for high speeds. Under such conditions, the engine likes to be reasonably "wet." It is rapidly flicked over until it begins to "pop," the compression is then reduced slightly, then quickly returned to the required setting as soon as the engine is running. The critical needle setting, for optimum performance over a wide range of speeds, was 2¼ turns open, on the test engine.

Despite the relatively heavy volume of metal to dissipate heat from the cylinder, as previously mentioned, the latter component ran very hot on the test engine. However, it was noticeable that the piston was rather tight at the top of the stroke and much of the excess heat generated can probably be attributed to friction thus occasioned. It is not known whether the A-M intentionally follows the practice, adopted in some engines, of a convergent cylinder bore, but, if so, a gradual reduction in the frictional loss and slight increases in power should be apparent for some hours after the initial running in period.

On the torque-reaction dynamometer, the A-M 25 was notable for the manner in which an even torque figure was maintained over a wide range of speeds. There is for example, a negligible variation in torque between 7,000 and 10,000 r.p.m., so that propeller changes on a F/F model causing variations in operating r.p.m. between these limits, would not induce serious torque variations to upset flight trim (possible effects of gyroscopic precession with different airscrews at different speeds, on flight trim, should not be overlooked when changing props, however).

The torque curve rises to its maximum at between 8,000 and 9,000 r.p.m., but declines quite slowly over the next 4/5,000 r.p.m., thus producing a flat peak to the power curve. Actual maximum output realised was .22 b.h.p. at approximately 12,750 r.p.m. The fact should not be overlooked that the A-M 25 is well under 2.5 c.c. capacity and that this output, equivalent to over 93 b.h.p./litre, is, therefore, a very good figure.

Power/Weight Ratio: (as tested) .88 b.h.p./lb.

Specific Output: (as tested) 93·5 b.h.p./litre.

The M.A. Engine Test next month will be the David-Andersen 1 c.c. diesel

Engine Materials—1

In the course of the M.A. Engine Tests numerous materials and material treatments used in the manufacture of engines are mentioned. The following brief explanations of some of the more commonly encountered terms will be printed each month on this page. For convenient reference, they are arranged alphabetically.

Alloy Steel. A general purpose term covering steels which contain above a specified proportion of certain elements, such as chromium, nickel, molybdenum, tungsten, etc. Alloy steels are widely used in model engine construction for such components as crankshafts and cylinders.

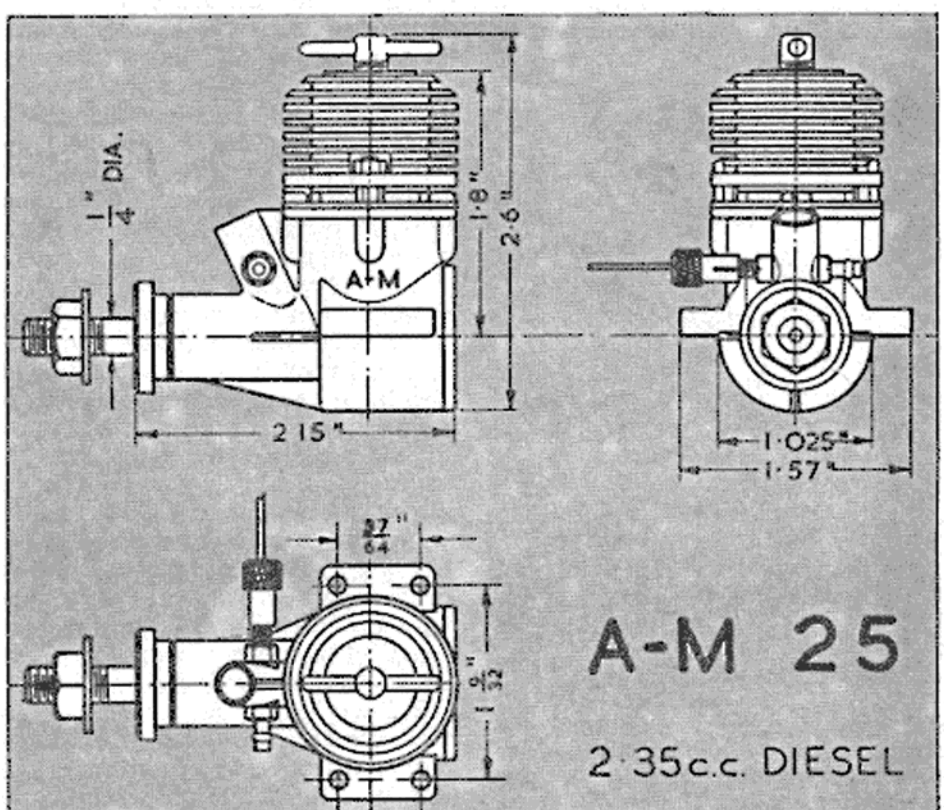
Anodising. Aluminium and aluminium alloy parts of model engines are often anodised to give them a corrosion resistant surface. As its name suggests, the process is an electrolytic one, the component becoming the anode in a cell containing dilute chromic, sulphuric or oxalic acid. The aluminium oxide film thus produced on the component can also be colour dyed, the process frequently used to produce the popular "red-head," etc. An anodised surface is a poor conductor and if electrical earthing is required through a component so treated, it is necessary to scrape the surface.

Beryllium-Copper. Used for valve reeds in reed-valve or flutter-valve engines and, commercially, for spring contact arms in electrical apparatus. A hard material of high tensile strength.

Blueing. A blued surface finish is sometimes found on steel screws and fittings. It can be obtained by a heat process (to about 300 deg. C.) or by a chemical process at a much lower temperature.

Cadmium Plating. Sometimes used as a means of rust-proofing iron and steel components, particularly cylinder fins.

Carburisation. A form of surface hardening applied to certain steels in which, by a heat process, the surface of the part becomes impregnated with additional carbon. See also Case-hardening.



Improve your COMBAT

by K. Jaques

IT is not long before the newcomer to C/L flying, once having mastered the more obvious "tricks of the trade," turns his thoughts to something involving a more severe test of his skill. Undoubtedly combat flying is the answer, providing as it does, some tricky problems in handling and tactics. This article has been written primarily as an introduction to the "art" and also in the hope that even the more experienced combat types may pick up one or two useful pointers.

As combat flying is primarily a stage removed from ordinary C/L, it will be appreciated that mastery of manoeuvres such as loops, bunts, figure eights and so on is an essential if you are to achieve any success at all. This includes both normal and inverted flying. When you feel reasonably sure of yourself try some stunts with two in a circle, and if you want to stay prang-proof choose a fairly calm day. Start back to back, then when you have gained a little more confidence, you or your partner can turn around a little (say 30-40 deg.) so that at times your respective manoeuvres overlap slightly.

Don Haworth, M.I.M., after winning a combat event at Rufforth last year. (Don recently broke his leg and is now convalescing—he would welcome correspondence sent via this office.—Ed.)

After practice at this you can finally stand side by side and really chase each other round in circles, each trying to clip the other's streamer. When you can put your model where you want it at the right time, and without having to shout warnings to your opponent, then you can safely assume that you are over the first hurdle.

Now is the time to start thinking about engine starting and setting and, much more important, doing it quickly. It is surprising how many combat fliers have been eliminated by a two-minute starting rule! I can safely state that nine times out of ten our Leeds team members are first in the air.

Also about this stage you should settle on the type of model you intend using, and as the season progresses, develop it to suit yourself. Don't use a different type of model on each outing. Choose a model you like and stick to it, but I shall say more about this later on. The same applies for the prop—keep to the one of your choice.

The only advice I can offer at this stage is to put in plenty of inverted flying, and also stunting from inverted. Fly left handed as often as possible so that eventually you are as proficient with the left as the right. Should your lines get entangled with your opponent's, fly out of it, after all, you flew into it! Don't dither about changing hands needlessly.

If you already enter the odd combat contest you will know just what goes on and eventually will join the select band of consistent winners. But before the happy day no doubt you will have had a few occasional wins to your credit. Was it luck? (Don't answer that!) Did his streamer *fall* off? Was it a collision where your model snagged his streamer as both models fell to the ground? Or was it something like his tailplane not standing up to it?

Chairman of the Meanwood Independent Modellers, Dave Perkins, in combat with Rob Gibbard during the inter-club finals

It cannot be denied that luck takes a hand in combat flying as much as in any other branch of model flying, but never depend on having *good* luck! Remember that skill and experience will play their part, even when Lady Luck seems to be against you. Developments, too, are always taking place in this branch of the hobby, so keep an eye open for something that may weigh the balance in your favour next time you are in a contest.

In our club there has been one factor which has played no small part in our success, and that is team work. It is absolutely useless messing about as a "lone wolf." I, personally, have nothing against the "lone wolf," but combat, like team racing, requires team work.

How many members to have in your team is largely a matter of how many boys in your club do combat flying—it's as simple as that. Unfortunately, it isn't often that there are even four C/L types in any one club with the "know-how." Consequently you will need to find four—even if it necessitates including one "non-flying" member—to do the launching and servicing only.

However, assuming that you do manage to form a four-man team, and all four fly, split the team into pairs of "A" and "B." This way the team can fly against each other, arranging the flights so that the two "A" members fly against their opposite members in the "B" team.

There is really no necessity to be tight on the rules, as any weak spots will soon be apparent; if one member of the team makes a mistake then it will be up to the other three to work on him!

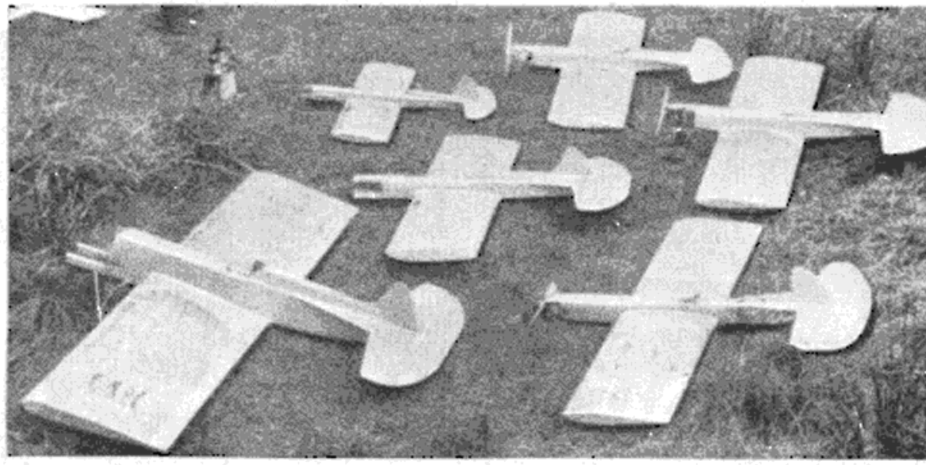
Each pair should have some definite hand signals to signify such terms as "Launch now," "Wait a minute," and so on. Also each member should know just how his partner likes the launch, how he likes the model held for starting, and other such points. It will be a great help too, if a member can start or re-start his partner's engine just as fast as his own—or better still, even faster.

When entering contests don't take only one model, remember combat is rough! Two, or even three models may be required to get you through a major event. This is where standardisation pays off, and it is a great asset if all the team members use the same type of model. If one of your partners "runs out" of models, offer him one of your own (if you have one left!) and, should he "prang," regard it as all part of the sport. Remember, the time might come when you will need to borrow a model.

Thus, if the necessity to borrow a model does arise, the fact that it is basically of the same type is an enormous help to the flier.

Now here's another little tip. If two of your team are drawn against each other (and this has occurred) decide *on the ground* which one is going to win. The one who is to lose should either fail to start up, or place his streamer conveniently in the way of his "opponent's" prop—much better from the spectators' point of view! Don't risk losing both entries when there is the certainty (99 per cent. anyway!) of having the better of the two models in the next round.

And now for some general notes. Lately there has been a spate of opinions on fuels, but generally speaking they were useless to us combat types as they were invariably for team race enthusiasts, and combat fuel requirements are definitely not the same. I have been working on combat fuels since August 1953, and am still working!



A large collection of "Kers," including several combat winners. The "Ker" in the centre is the "Ker-mando" M.A. Plan 186.

At one period last year I carried around a separate bottle of fuel for each individual "BB." This, incidentally, is the only correct solution. However, I eventually got fed up with this arrangement and went back to the usual routine of one mixture for all my "BB's."

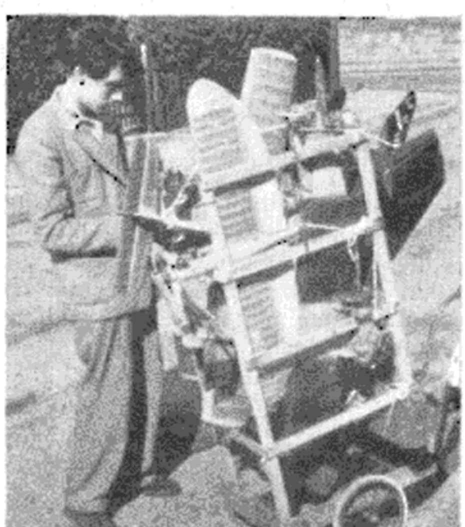
Fortunately we have had no trouble with the fuel so I will list here a typical mixture of what was used.

A diesel oil mixture first: diesel oil, 69 per cent.; S.A.E., 60, 12 per cent.; ether, 19 per cent. For dope try 1 per cent. ethyl nitrate plus 1½ per cent. amyl nitrate.

Now a paraffin brew: paraffin, 62 per cent.; Castrol "R," 17 per cent.; ether, 21 per cent. For dope try 2¼ per cent. ditert butyl perox.

Please note that neither of those two mixtures is suitable for running-in purposes!

This last mixture is easier on the engine: paraffin, 50 per cent.; "R," 22 per cent.; ether, 28 per cent.; and dope with 2¾ per cent. amyl nitrate.



A Derby M.A.C. member with the club's transporter, ready for a day out.

One of the most neglected items in power flying is the propeller. From the little gen that is available, one works out the size of the prop required, only to find that the nearest prop made is perhaps 1 in. in pitch under or over, and ¾ in. in dia. larger or smaller. Then, if you decide to become a little technical, you could introduce blade area, shape, aerofoil, weight, and so on. Most certainly this would mean carving your own—unless you have a friend in America! In this country we have only two or three props which come anywhere near our requirements.

For combat the revs. need to be a little higher than for stunt, and this makes for a faster recovery from stalls, among other things. Consequently, I suggest cutting $\frac{5}{16}$ in. off each blade of the prop you normally use for stunt. For example, in our club we stunt on 8⅝ in. × 6 in. nylon props so for combat we use 8 in. × 6 in. nylon.

Nylon props are virtually unbreakable, and need to be for combat. Occasionally it is necessary to land quickly, and take-off again even faster; to include a prop change would result in elimination. It is things such as this that make nylon props essential.

At the beginning of this article I mentioned that an ability to stunt was essential.

Firstly, even if you did very nicely for yourself in the Gold Trophy event, this does *not* make you a "natural" for the Combat Cup, although it does give you a better chance than the chap who is still fighting his way round consecutive loops.

(*Continued on page* 237)

OVER THE COUNTER

Delayed by a change in production policy, Skyleada's half-c.c. fully aerobatic profile-type control-liner, the *Crackerjack*, is at last on its way. Featuring a thick symmetrical wing, this design passed out by "going through the book" with a Frog "50"—the smallest of the "half-c.c." engines. Model accommodates any beam-mounted engine of up to 1 c.c. and is very easy to construct. Kit price 8s. 9d. The same company have also introduced new models in their flying scale range—the *Jet Provost* and *Gnat* (Jetex powered), and *Seamew* and *Bird Dog* (rubber powered). Coming along is something special in the way of contest gliders.

* * *

Next addition scheduled for the KeilKraft range is the *Nomad*, a 20-in. span easy-to-build glider with printed, die-cut fuselage and tail parts from sheet balsa, built-up wing, tissue covered with die-cut ribs. Also coming out shortly is the *Shadow* series of flying models—profile type scale models, with all die-cut and printed parts, for Jetex "50" power. First two models in the series are the *Shooting Star* and *Attacker*. No prices announced for any of these kits yet, but watch the K-K advertisement. Also expect some more World War I fighters to appear very shortly in the ⅜ rubber flying scale series.

* * *

Full of ideas for new productions, H. J. Nicholls also finds time to keep right on top of the accessory business. Passed over for comment recently was a Dutch made R/C actuator—produced by the manufacturers of the "Tornado" engine—which Henry is importing into this country. Simple in design, this unit scores over most of its contemporaries with brilliant magnetic circuit design. In fact we rate it as one of the most satisfactory of the simple sequence servo units that we have yet handled. The manufacturers specify operation on 4.5 to 7.5 volts. After our tests we would have enough confidence to operate it on 3 volts, and 4½ volts should provide a good margin of safety. Price 22s. 6d.

* * *

KeilKraft are producing a new range of galleon kits, twice the size of their former models.

A new ½ in. to the foot scale pilot, to the same design as the 1 in. to the foot pilots illustrated in the May issue, suitable for ½ A class team racers, is now distributed by Peter Smith, of Croydon. The half-length dummies, clad in current standard flying clothing, weigh less than 1/10 oz. At this weight they are suitable for many of the three and eightpenny flying scale kits now on the market. The pilots are available unpainted at 1s. 9d.

* * *

It seems that the reference made in "Over the Counter" last month to the fact that Berkley Models were interested in introducing their kits into this country to be made under licence, has caused a number of rumours to circulate in the trade, speculating which firms may be involved.

In this connection, Plantation Wood, who import and distribute Solarbo balsa, have asked us to state that they are *not* contemplating kit production, either under licence or otherwise.

* * *

Mike King and his wife, both well-known glider contest fliers from Southend, now have in production the *Dab* and the *Inch Worm*, two of their own designs, marketed under the name Contest Kits. The *Dab* costs 9s. 11d. and the *Inch Worm* 19s. 6d.

Book Department

Reviews of current aviation literature

Continental Military Aircraft. *By John W. R. Taylor.* Ian Allen Ltd. Price 2s. 6d.

This 1955 edition is a considerable improvement over that of last year, with better illustrations and an increase in size—but no increase in price. Some of the older aircraft featured in the first edition have been omitted, but the book still contains some rarities serving with the Spanish Air Force. In this way earlier volumes in this ABC aircraft series never become out of date in the usual sense, as each presents a record of aircraft in current use for that particular year. In fact, some of the earlier editions of "Civil Aircraft Markings," for instance, are becoming "collectors' items."

"Continental Military Aircraft" maintains the high standards set by its companion volumes and presents an interesting and compact record of aircraft less familiar to enthusiasts in this country.

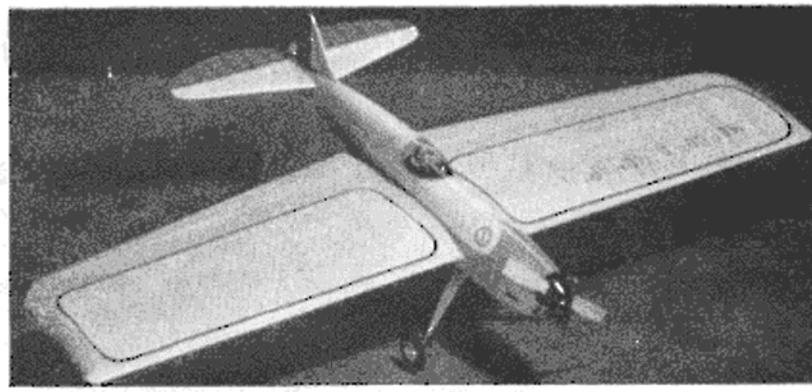
How to make Marquetry Pictures. *By J. Anderson.* Percival Marshall. Price 4s. 6d.

The hobby of producing marquetry pictures is at the present time increasing in popularity, and for those who are interested in this subject we can recommend this hand-book, which, well produced and illustrated, gives an admirable insight into marquetry work.

OVER THE COUNTER

KIT REVIEW

THE MERCURY MONARCH 2.5-3.5cc Stunt Model



An A.M.25 powered version of the "Mercury Monarch."

FIRST completely pre-fabricated kit to be put out by Mercury, the *Monarch* is a 382 sq. in. stunt control-liner in the modern trend with an 18 per cent. thick symmetrical aerofoil—fully aerobatic performance coupled with pleasing semi-scale appearance. It is a big job, ruggedly constructed and its manoeuvrability and control response is of such a high order that several of the top class stunt fliers who had an opportunity of test flying the prototype endorsed the design in the most convincing manner possible—they placed an order for *Monarch* kits "just as soon as available."

The *Monarch* kit should be appearing in the shops about the time this report appears. It would have been out earlier but for the decision taken at a late stage in development to go over to complete pre-fabrication and eliminating printed sheets in favour of die-cutting. The wait has been worthwhile. Mercury, in conjunction with Solarbo, have gone to a lot of trouble in getting every part of the kit "just right" so that builders have all the cutting out and hard work done for them, yet leaving enough assembly and final shaping to be done that you end up with the feeling that you have still built the model. An ideal arrangement, in fact, particularly for this type of model.

We would remark, particularly, on the attention given to wood grading throughout the kit. Material for all the parts has been graded according to weight—really light stock for the wing tip blocks, light-medium for the tail surfaces, etc. This has been carried out with an expert touch. Also the precision with which shaped parts have been formed is of the highest possible order—more accurate, in fact, than the average modeller would achieve on his own.

As a result of this, builders should have no difficulty in reproducing their *Monarch* at the same weight as the prototype—26 oz. complete—or even lighter. Then they will have a potential contest winner on their hands. It can be adapted to take a wide range of engines of 2.5 c.c. to 3.5 c.c., but is obviously specially matched to the Allen-Mercury "25" and "35."

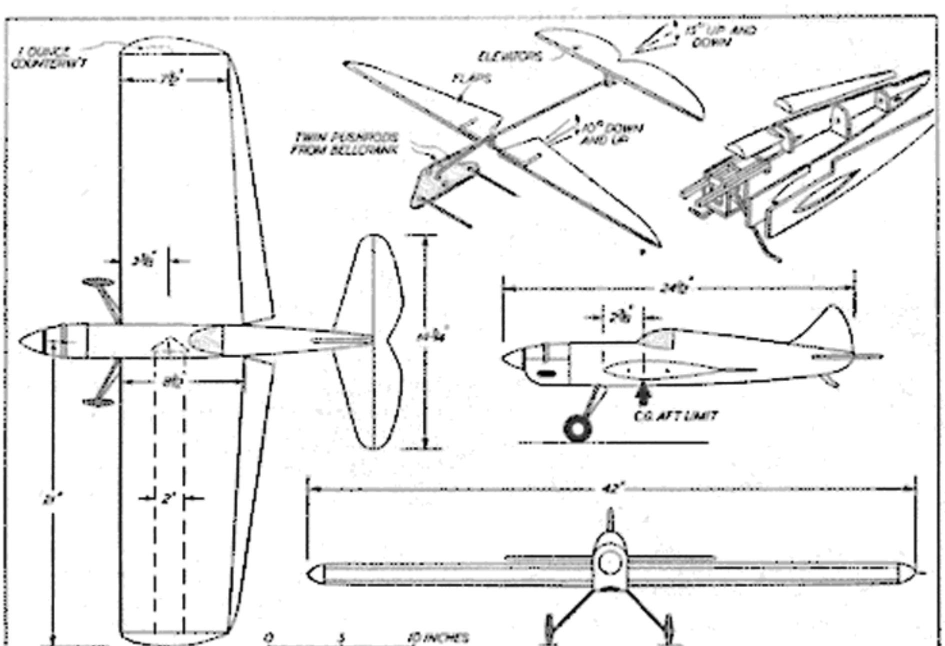
The *Monarch* is a model which any stunt pilot should really enjoy flying: 2.5 c.c. power is more than adequate for a complete aerobatic performance on a 9 × 5 propeller. (A 10 × 5 propeller is recommended for 3.5 c.c. motors.) Combining flap and elevator control, response is smooth and most manoeuvres require only a relatively small control movement.

Balance point is not critical, provided the aft c.g. limit is not exceeded. Balanced on the aft limit, line pull is quite light and the machine extremely lively. Less experienced pilots would probably prefer a slightly more forward c.g. position for additional pull on the lines. The farther forward the c.g. the stronger the *Monarch* pulls and the greater the control movement necessary to complete the same manoeuvre. Even with the c.g. as much as ½ in. in front of the front line, however, it will still go through the complete stunt schedule.

Altogether, in fact, the *Monarch* is as good a stunt model as you could even hope to get. It is intended for the fairly experienced pilot and we would not recommend it for a novice. But we would have no hesitation in recommending it for anyone who wants to win contests—or just enjoys flying a really aerobatic machine. Performance is limited only by the individual pilot's ability.

It is seldom that any design is free from some criticism, however, and we have ours of the *Monarch*. Actually this covers only two detail points, one of which Mercury already deal with in their instruction manual. This is the replacement of the plywood tailskid specified with a wire one. Mercury say that the ply skid wears too rapidly operating off tarmac, etc. We would endorse this and add our opinion that it would sooner or later get knocked off, either in landing or engine-starting. The other point is that we, personally, would have reshaped the top of the undercarriage wire to get the maximum possible depth attached to former F2, i.e. taking the top of the undercarriage right up to the bottom of the tank.

Finally, to all builders of the *Monarch*—and we have little doubt these will be numbered in their thousands—*do* read the instruction manual and follow the building sequence described. It will save you time in the long run.



The North American
MUSTANG

ONE OF THE FINEST FIGHTING PLANES OF WORLD WAR II.

The F-51 H

ONE of the finest aircraft to come out of the last war, the F-51 *Mustang* is still in operational service with many of the world's air forces, and although perhaps "old fashioned" in these days of jets and turbo-props, it has a nicety of line that undoubtedly will appeal to the scale modeller.

Although a progeny of North American Aviation Inc., the *Mustang* was designed and built to a British specification, which perhaps accounts for its rather un-American lines. The prototype, the XP-51, first flew in October, 1950 and, like most fine aeroplanes, went from success to success with each progressive variant. It fought in most theatres of war, and in each gave the same distinguished service.

The *Mustang* first became headlined in the early part of 1941, when it was reported to be in quantity production for the Royal Air Force. When, eventually, the machines started to flow to the squadrons, considerable anxiety was felt in some quarters owing to the *Mustang* having a superficial resemblance to the Messerschmitt Me 109E in plan form. At the time, it was suggested that this was due to the plane's designer having once worked in Willy Messerschmitt's drawing office!

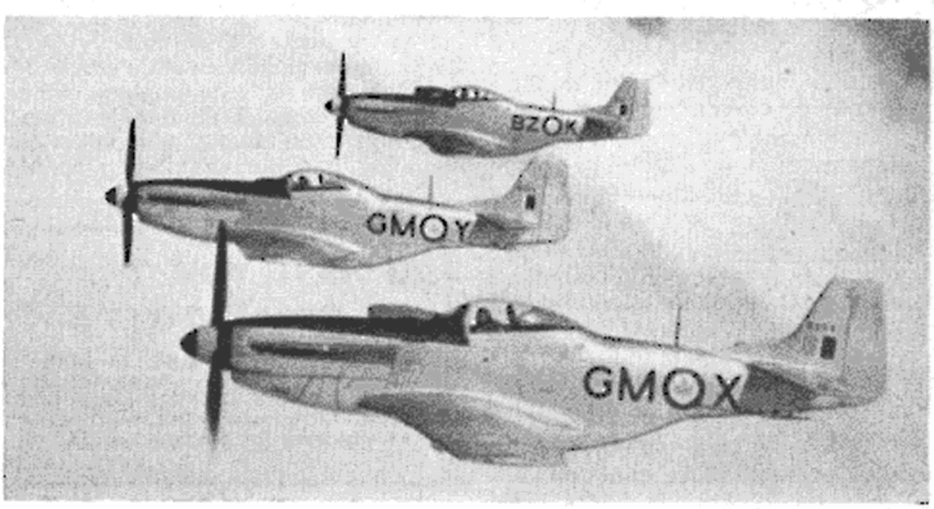
Early versions were powered by an Allison 1,150 h.p. liquid-cooled in-line engine, which had limitations in high level performance, consequently the *Mustang I* was primarily used by Army Co-operation Squadrons for artillery spotting, high speed reconnaissance and ground strafing, and its excellent stability and control made it ideally suited for this type of work. Armament of this mark consisted of four .50 machine guns and four .303 machine guns, and the top speed was around 370 m.p.h. at 13,000 ft.

Subsequent variants of the *Mustang I* differed mainly in armament details and became the Mk IA in the R.A.F. The U.S.A.A.F. (as it was then) too, were, of course, using the P-51 and also developed it into a fighter-bomber, which in the U.S.A.A.F. was the A-36 *Invader*. It carried a bomb under each wing, and incorporated fold-back dive brakes on both top and under surfaces of the wings.

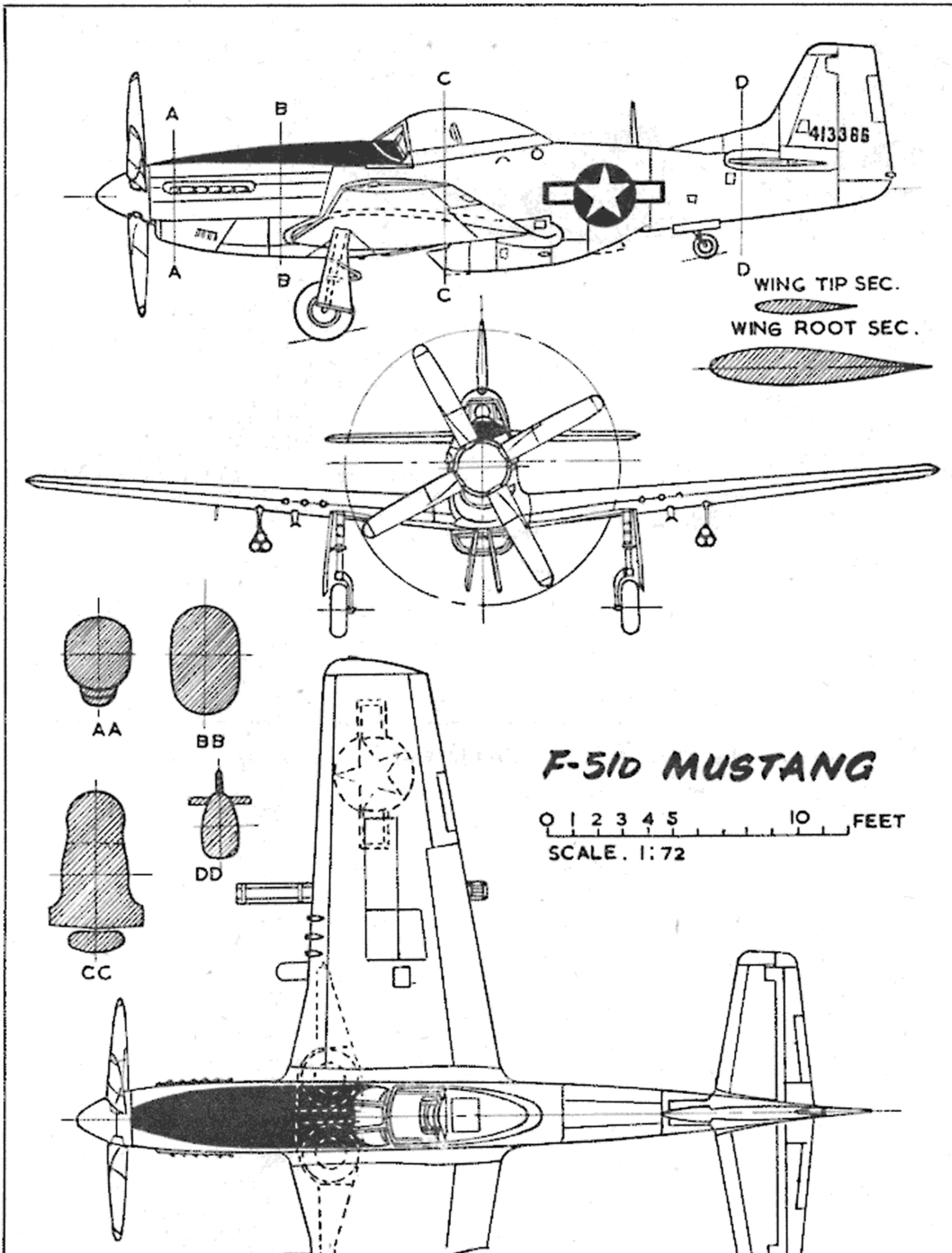
Turning point in the *Mustang's* career came when, as Lord Beaverbrook so aptly put it, "some genius had the idea of putting Rolls-Royce engines into *Mustangs* . . ." He referred, of course, to the Packhard-built Merlin, which gave a considerable increase in power and performance over the Allison. Designated the P-51B, the new *Mustang* became the Mk III in the R.A.F.

A number of modifications were necessary to accommodate the Merlin, including deepening the characteristic radiator and adding an induction air-intake under the nose for the two-stage supercharger.

Superb as a long range escort fighter, with drop tanks fitted it could escort bombers on daylight raids as far away as Berlin. With two 500 lb. bombs replacing the drop tanks it easily assumed the role of a fighter-bomber, and in fact played no small part in the Allied invasion of Europe. Armament varied according to its role: the escort fighter had four .50 in. machine guns in the wings, while the fighter-bomber version could be fitted with four 20 mm. cannon. Top



"Mustang" IV's of the Royal Canadian Air Force are used for a variety of duties. The two GM Squadron aircraft shown here are used for high speed target towing, while others, such as BZ-K, assist in radar calibration tests.


A
B
C
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413366
WING TIP SEC.
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F-51D MUSTANG
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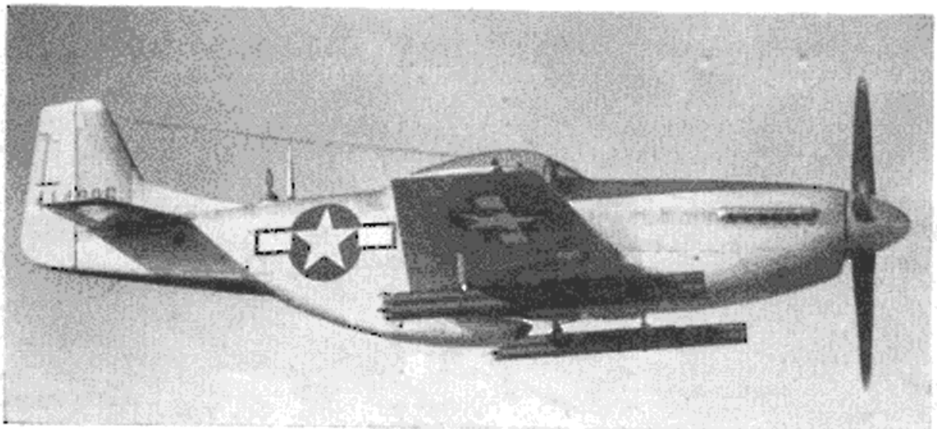


This type of "Mustang" operated in the Pacific Zone with "bazooka" rocket projectiles mounted beneath the wings.

speed of the Mk III was 425 m.p.h. at operating height.

Up to this period, the *Mustang* had a cockpit cover that hinged sideways (another Me 109 feature!), but in mid-1944 a variant appeared with a bulged backward-sliding hood, similar to that fitted to *Spitfires* of the period, and became the P-51C. British P-51C's had the standard camouflage, while the American machines were left in their natural aluminium finish.

Almost inevitably, the *Mustang* eventually appeared with a "tear-drop" cockpit cover and became the Mk IV in the R.A.F. and the P-51D in the U.S.A.A.F. The R.A.F. version was used considerably in support of Marshal Tito's forces in Jugoslavia, operating from airfields in Italy. However, the bubble canopy resulted in a decrease in the keel area ahead of the tail unit, and later sub-series of this mark had a dorsal fin extension to maintain directional stability. Although further variants followed, including the F-6 photo-reconnaissance type, the P-51D was—and still is (as the F-51D)—the most widely used.

A variety of armament could be carried, including rocket projectiles and even depth charges. For a single seater its range was phenomenal, and from early 1945, Iwo-Jima based *Mustangs* escorted B-29s over Japan, thus making round trips of nearly 4,000 miles.

The *Mustang*, as we have shown, could cope with a wide variety of duties, but perhaps one of the most unusual performed during the war was the marking of target areas for 617 Squadron, and described by Paul Brickhill in his book, "The Dam Busters."

Group Captain Leonard Cheshire, when he was C.O. of 617 Squadron, had the idea of flying a smaller air-craft than the *Mosquito* he was then using to drop smoke markers on specific targets. The *Mustang*, with its excellent range, fitted his requirements admirably and consequently, by by-passing the usual channels, he "acquired" one from an American Air Force base.

Cheshire, although not having flown a single engined aircraft for five years, had the feel of the *Mustang* within half an hour. He was delighted with his new mount, and it enabled him to achieve a high degree of accuracy by diving onto the target to drop the smoke markers.

Subsequently, Wing Commander Willie Tait took over command of the Squadron and he too, of course, flew the *Mustang*. On one occasion, after releasing his markers and climbing to 4,000 ft., he noticed that wisps of cloud would probably obscure the smoke from the Lancasters some way back at 18,000 ft.

Nothing daunted, Tait called up the bombers and told them to try and aim at him. Whereupon he dived into the flak and circled the target at 1,000 ft., hoping that the glinting wings of the aluminium-finished *Mustang* would enable the bomb aimers to obtain an accurate sighting. Flak hit the plane in a number of places, including the self-sealing petrol tank, but it kept on flying and Tait managed to reach home safely after this episode. That Tait survived the war, we know, but it would be interesting to learn the fate of this particular *Mustang* that had performed such an unique duty.

When production ceased in 1946, 15,576 *Mustangs* had been delivered and of these many hundreds are still flying.

F-51D "MUSTANG"

Type: *Single-seat fighter. Dimensions*: *Span*, *37 ft. 0¼ in.*; *Length*, *32 ft. 3¼ in.*; *Height*, *13 ft. 8 in. Engine*: *One 1,490 h.p. Packhard-Merlin. Weight loaded*, *11,100 lb. Performance*: *Max. speed*, *445 m.p.h.*; *service ceiling*, *41,000 ft. Armament*: *Six .50 in. machine guns in wings.*

The Bearcat . . .

Continued from page 214

the celluloid canopy cemented in position. The framework is painted on. Undercarriage doors are cut from plywood or aluminium and wired and soldered to the legs after fitting the 1½ in. celluloid wheels. Aluminium or card doors are glued to the fuselage. The wing tips are cut away to take the glass-headed pin navigation lights which are then covered with celluloid. The tail light is pressed into the rear of the fuselage; 20-g. wire aerials are fitted to the rear top decking and gun ports are cut in the leading edges. Cooling gills are cut from card and cemented to the rear of the upper engine cowling between the exhaust stubs. Rocket launchers of 3/16 in. sheet are cemented outboard of the gun ports below the wings.

Painting

The wings carry the star and bars insignia on the port upper and starboard lower surfaces with 25 NAVY on port lower and 25 V on starboard upper. The fuselage has 25 on the cowling, star and bars below the rear portion of the cockpit, an orange band bisected on each side by NAVY GLENVIEW (in orange) and, at the rear, F8F-2, NAVY, 95437. A large V appears on the fin and rudder, all lettering being in white except as noted. A final overall wax polish is given together with a coat of fuel proofer. For exhibition, a four-bladed airscrew is fitted but a plastic 8 in. × 4 in. one is recommended for flying.

The amount of detail makes the "Bearcat" worthy of entry in any Concours.

Topical Twists

Just up his Street

In concluding a three page soap box marathon on the evils of duration flying, one of the hot gospellers of the Realist cause did a magnificent back somersault off the pulpit by declaring that he didn't build models to look at.

Well, nor do I, come to that. Which is understandable, as no one could regard my botched up efforts with fond admiration, not even if models had mothers. But for the arch-priest of scale ornamentation to make such an admission is enough to cause any self-respecting Realist to blush to the roots of his lacquered wings; for it implies that all the strut and cabin dressing is not to provide a pleasing eyeful for the proud constructor, but to bedazzle the baleful blinker of that anonymous character, known as the man-in-the-street.

Now what this concrete-plodder has to do with model aircraft, apart from giving the horse laugh to the sight of overgrown kids playing with toy aeroplanes, is a bit of a puzzle; but a psycho-analysis of our man-in-the-street will reveal a deep frustration, going back to the time when, as the boy-in-the-street, he was prepared to swap his champion conker, fag cards and pet snake (only dead a week) for a flying toy aeroplane that looked just like the real thing. A subconscious desire which now manifests itself in the secretive purchasing of 3s. 6d. kits.

Exploiting this psychological kink to the full, the silver dope and cabin brigade are tantalisingly waving their super, dream-of-every-child toy aeroplanes under his nose, in the hope that his horse laugh will eventually give way to a whinny of delight.

By thus winning the approval of the man-in-the-street all would be well. The Realist would no longer have to sneak furtively out of the back way in order to make his shame-faced way to the flying field. He could go forth along the main street with head erect and model openly displayed, and with not so much as a horsey titter to discourage him. In fact, he'd feel no more ashamed of his hobby than any slap-happy duration type.

● ● ●

That new solvent for removing cement from clothes should come in useful on my old modelling jacket. This hoary relic is so thickly caked that when it went to the cleaners they didn't know whether to clean or polish it.

News of this solvent coincided with a survey of model adhesives. A survey which did not, as we hoped, include any mention of the development of the ideal balsa cement, a substance which would adhere to balsa with the same tenacity as the present stuff does to fingers and best Sunday clothes.

● ● ●

Balsa Strip

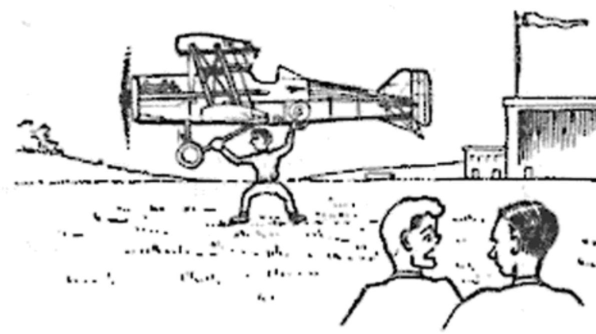
Now that it is generally considered that the modelling public is composed of a bunch of scale-struck adolescents, struggling with their first three and sixpenny kits, it is not surprising that the horror of the comic strip has invaded even this august and adult journal. Admittedly the assault is only on a minor scale, confined to the advert section, but what if the dialogue balloons make an airborne attack in force on the editorial pages? Already the American model mags (those that still charitably squeeze in the odd model page between "Sabre Jet Gossip" and the "Global Atom Bomber") are running pictorial knowhow strips.

Possibly you've seen the sort of thing. Little Elmer's Gee-Whizz power job keeps horsing into a heluva spiral, which is upsetting Little Elmer more than somewhat as he had traded his best Hopalong Cassidy outfit for this same beat up crate that very a.m. Luckily along happens Big Jim, the club know-all, to give Little Elmer the lowdown on the trimming angles. Result—Little Elmer's job is hot-footing it o.o.s., while Big Jim sends up an extra special size in balloons to announce, "Never fly a crate without the tailplane—it's them little details that make a top-notch flier."

Once the trend gets really under way, we can look forward to the appearance of Supermod; an inoffensive rubber powered character which, on the magic word "Prangem!" is transformed into a supersonic, radio controlled jet—the guardian of the model skies.

A typical episode might deal with a model club that uses the local park as a flying field. An arch-criminal—one of the protesting park-side residents—is plotting to have the club thrown off.

Comes the memorable day when the mayor visits the park to open the new control-line area. He is standing waist deep in the long grass, when out of the clouds swoops a sinister black model. Whoosh-wham-m-m—blam-m-m, and sundry stereocomic sounds, and the mayor is struck violently in the Corporation by the evil interloper.



"Believes in building 'em to look like the real thing."

The club is naturally blamed and banished from the park in disgrace. But, suddenly, "Prangem!", and Supermod is on the scene. Its super, X-ray, telepathic model detector locates the offending model in the Arch-criminal's shed, together with the Marble Arch, Admiralty Arch, and the fallen arches of the entire police force.

Amid cheers of "Good old Supermod," the club is vindicated, and the arch-criminal suitably punished by having the control line area shifted to a position just outside his back garden.

● ● ●

Air Trailer

We see that the super, colossal, tremendous, etc., model of the year took as long in the making as "Gone With The Wind"—three years. This, we understand, was an all out effort, unlike the building progress of most models today, which are feverishly assembled during television breakdowns.

Ultimately, we suppose, this super model will reach the model mags in plan form, when, no doubt, some bright optimist will take up the challenge in the hope that there will be somewhere left to fly it in three years' time.

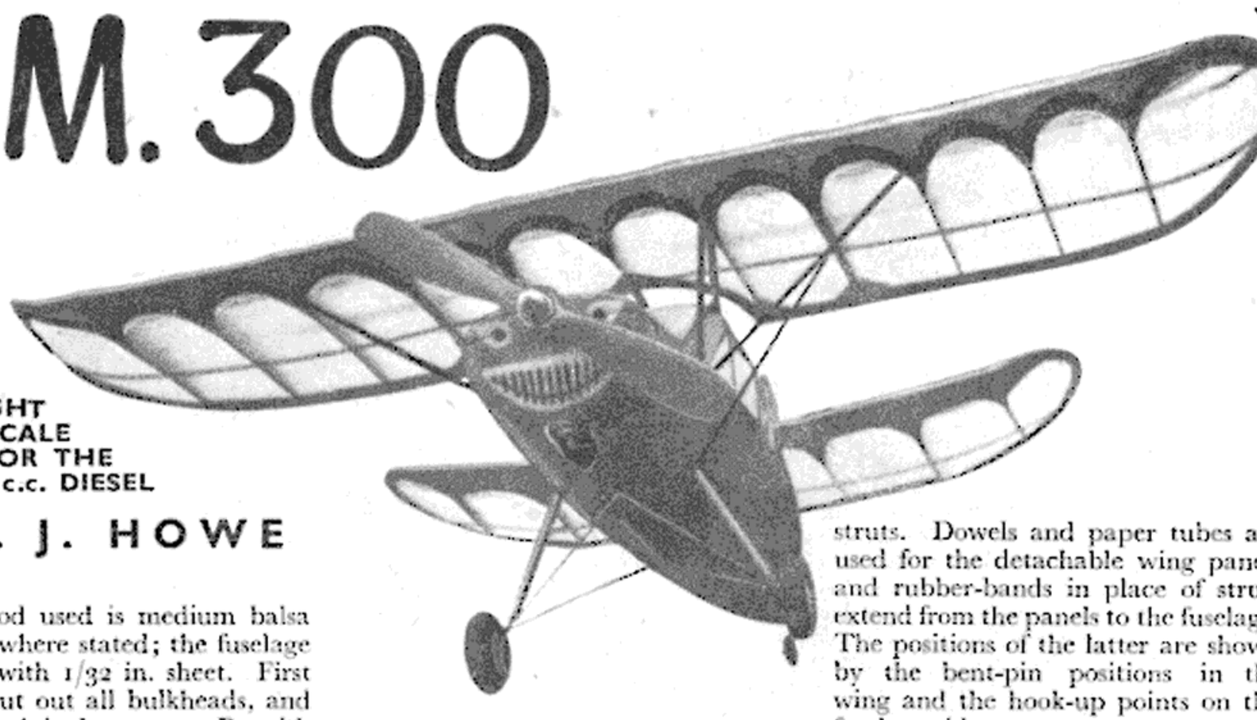
● ● ●

Fin(n)ish

Finnish modellers hold many of their winter comps on frozen lakes. This means that each year they see their flying fields just melting away—just as we do in this country.

Pylonius

H.M. 300



A NOVEL FREE FLIGHT FLYING SCALE MODEL FOR THE MILLS .75 c.c. DIESEL

by A. J. HOWE

ALL wood used is medium balsa except where stated; the fuselage is covered with 1/32 in. sheet. First step is to cut out all bulkheads, and note that B2A is the same as B2 with the exception of the top, which is cut to fit over the bearers and to receive the top longeron. B3 is in two pieces, one of ply and one of balsa, cemented together with the balsa side foremost. But before joining the two faces, the undercarriage wire should be stitched to the plywood.

Having prepared the bulkheads, now mount the nose block of soft balsa on B1 with the piece cut out to take the crankshaft. This piece is then cemented on B1A. Drill engine bearers to suit the unit used, and glue B1, B2, and B3 in position on the bearers using Croid or Durofix in preference to balsa cement. Cut two pieces of 1/32 sheet balsa 13¾ × 1⅞ in. and glue one piece of 3/32 in. sq. × 17 in. along one edge of each of the two sheets, thus forming the main longerons and fuselage sides. Now mark bulkhead positions on longerons and glue B4 and B5 in place. When dry, this assembly can be mated with B1, B2, and B3; the front edge of the sides are cemented to B3. When dry pull in longerons to tail and mount B6 and B7, and also stern post, B8.

Next cement in the ⅛-in. sq. keel longeron and also the ¼-in. sq. undercarriage braces, and then position B5A and B5B onto the main assembly. The two balsa blocks at the tops of B4 and B5A and B are also added at this stage. Build up fin aft of the stern post, and cement and bind tailwheel and main undercarriage assembly to keel. The soldering of the undercarriage bracing can be completed, leaving off the wheels.

Now cement the wing struts, noting that the rear strut, the base of which joins the centre of B5, is a single unit. The rear wing mounting longerons, from B5A to B8, should also be added, covering with 1/32 in. sheet. Once these are in position the foremost section of the fin can be completed.

The top and cabin sides are covered with 1/32-in. sheet, and as this is rather tricky, the sheeting will need steaming and water-soaking. It is easier to cut out the windows when the sheeting is in position, and so avoid splitting at critical corners. Also sheet in front of windscreen between B2 and B3 down to main longerons. Fit windscreen diagonal braces and then position windscreen and windows, but note that the windscreen is not cemented to the braces.

Cover the bottom of the fuselage with 1/32 in. sheet and fair undercarriage legs with balsa. Cut out the balsa nose block to the outline shown shaded on the plan, to take 1/16 sq. balsa strips cemented vertically approximately 1/16 in. apart, to form the cooling grille. The detachable cowling is made by cementing three strips of 3/32 sq. balsa to B1A and B2A, and covering with 1/32 sheet. Cut a small hole in top of cowling for needle extension and a small hole in the bottom for the compression lever. Fit the dowels to retain the rear wing; solder on the wheels. Finally rub down the complete fuselage with fine sandpaper.

Study of the plan will show that the wing construction is quite straightforward, but be certain that the centre section fits squarely on the struts. Dowels and paper tubes are used for the detachable wing panels and rubber-bands in place of struts extend from the panels to the fuselage. The positions of the latter are shown by the bent-pin positions in the wing and the hook-up points on the fuselage sides.

Points to Note

The following points may prove helpful during the building and perhaps will obviate any snags liable to crop up through an oversight. Drill the engine bearers with a 7/64 drill and use 8 B.A. nuts and bolts—this way you can get plenty of side thrust.

A piece of 22 s.w.g. wire bent at right angles and soldered to the undercarriage leg will help to prevent the fairing moving.

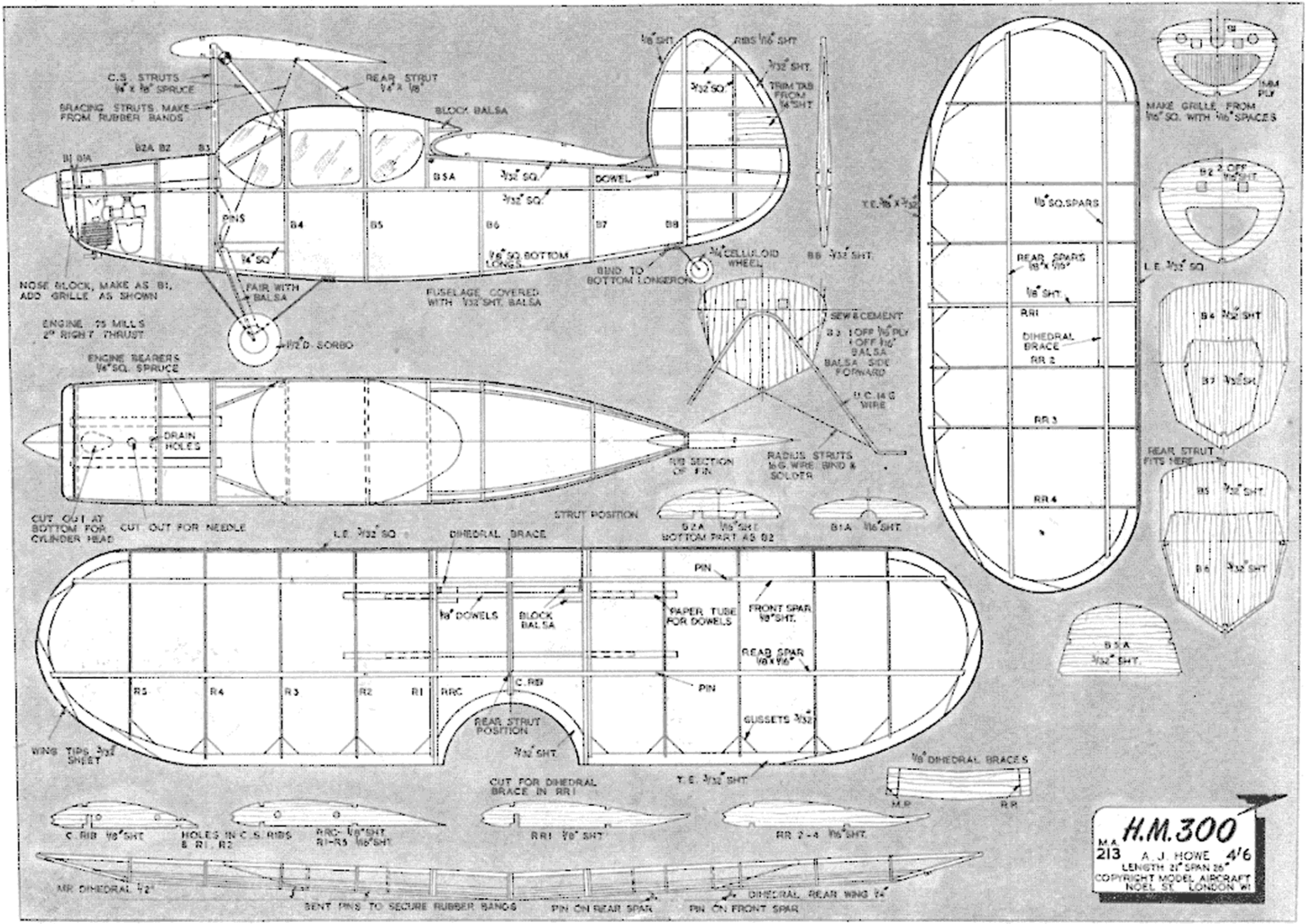
The bottom covering is left for the last operation, thus making it easier to fit the windows. The wing tips will need curving to wing section and this can be done with a hot iron, and make sure you have good joints between the tip sections.

Cover the whole model with lightweight tissue and give three coats of thin clear dope.

For flying, I use an 8 × 4-in. prop on a Mills .75 engine, mounted with 2 deg. right thrust. The model should balance just aft of the struts. After obtaining a flat glide, trim for a slight right turn. First flight should be on half power until satisfactory results are obtained. It is possible that an increase in power will give a sharper turn, so increase side thrust—but never to the extent that you get a right-hand power turn, as it is fatal.

The take-off is very fast, and despite a short run, most realistic.

The H.M.300 makes an intriguing little model, and although hardly in the super scale class, will give many hours of flying for fun. One last word—don't forget the fuel proofing.



FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 4s. 6d., POST FREE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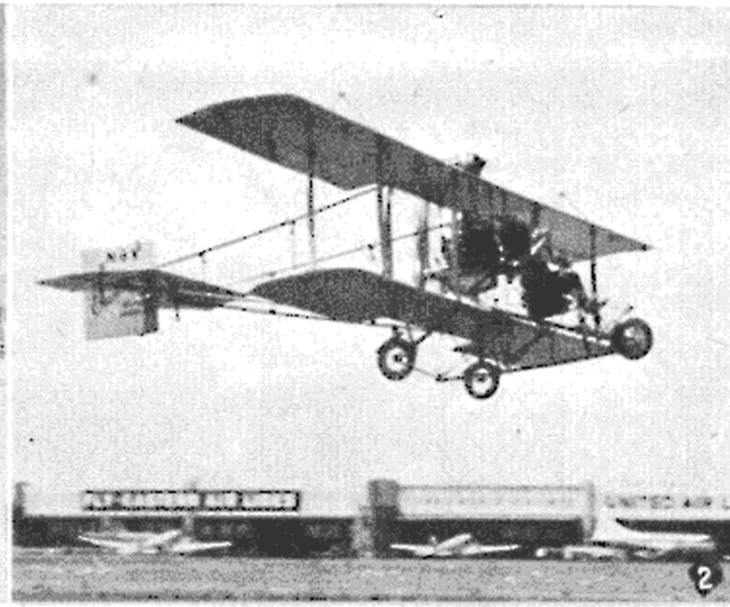
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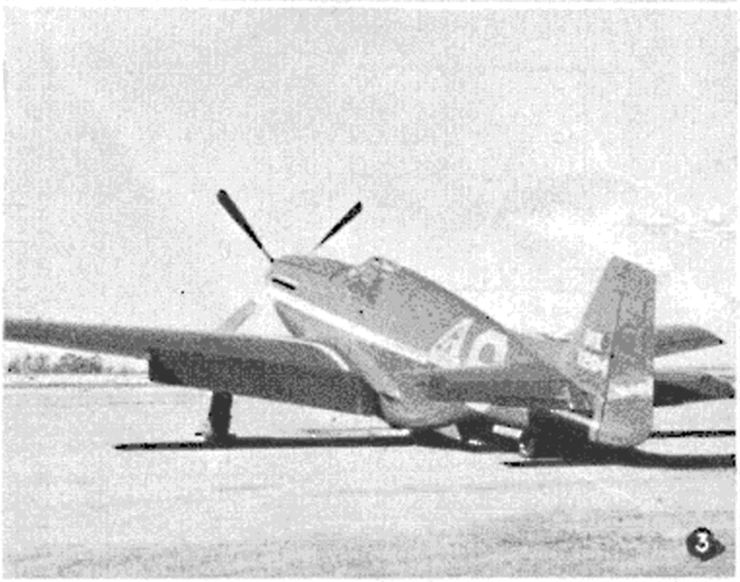
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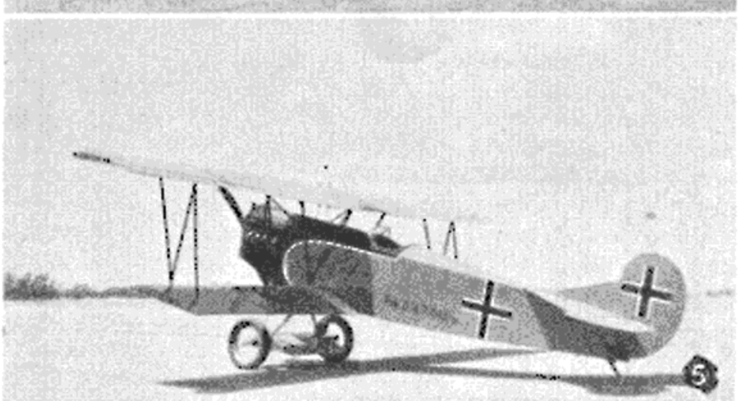
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THE PAUL MANTZ COLLECTION

by J. W. R. Taylor

Notes and pictures of a unique 'flying museum' in America

HAVE you ever heard of Paul Mantz? Probably not, which is a pity, because he is one of the most interesting characters in aviation. To start with, he won the gruelling U.S. coast-to-coast Bendix Trophy Race three times running in 1946-8, so that he ranks as one of the finest cross-country pilots in America.

Before that he was a stunt pilot for the movie industry. But the thing for which the whole aviation world owes him an immense debt of gratitude is that he has rescued from the bonfire a unique collection of historical aircraft, and maintained them in flying condition, so that we can still catch the odd glimpse in films of what flying used to be like in the good old days of rotary engines and castor oil.

At the time of Hollywood's "flying epics" of the 1920s, there were well over 50 1914-18 warplanes in airworthy condition in the United States. For example, seven of the Fokker D.VII's in *Hell's Angels* were genuine, being survivors of a complete squadron belonging to the U.S. Army Air Corps.

The rest of the D.VII's were skilfully-faked Travelaire biplanes; but most of the S.E.5's were genuine, as were odd types such as the Bristol Fighter, Avro 504K, Spad S.XIII, D.H.4, Thomas Morse Scout and Curtiss "Jennie."

With typical abandon, when the film was finished, the property people piled most of these aircraft on a bonfire and put a match to them! But for Paul Mantz, the few survivors would almost certainly have gone the same way.

His collection, housed at Santa Ana, California, now includes a replica of the 1910 Curtiss military biplane, a D.H.4, Orenco Model F, Fokker D.VII, Nieuport 28, Spad S.XIII and a 1930 Pitcairn *Mailwing* More modern types are a General Motors-built TBM *Avenger*, Convair L-13 and North American B-25 *Mitchell*, all three of which are used for air photography; and the P-51C-10 *Mustang* in which Mantz won the 1948 Bendix Race.

The Spad S.XIII C-1 is particularly interesting, as its serial is only a few numbers away from that flown by America's World War I ace of aces, Eddie Rickenbacker. Powered by a 235 h.p. Hispano-Suiza 8B Ec engine, it is camouflaged in a blue, grey, white and brown combination and carries the famous "Hat-in-the-ring" insignia of Rickenbacker's 94th Pursuit Squadron of the American Expeditionary Force. Top speed is still about 125 m.p.h. and, although the Spad has little inherent stability, it can hold a steady 45 deg. climb. Wing span: 20 ft. 4 in.

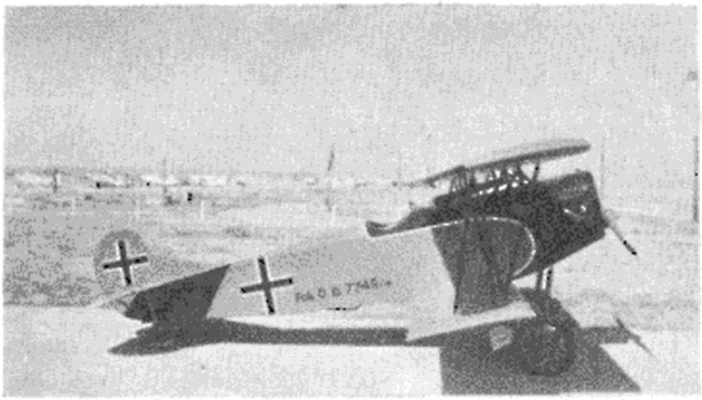
The Fokker D.VII is not quite standard, as its original Mercedes engine has had to be replaced by a Hispano, to maintain it in flying condition. Otherwise it is a faithful example of Anthony Fokker's formidable biplane which owed its supremacy to its ability to retain sensitive control at slow flying speeds and high altitudes, even more than to its high speed of 135 m.p.h. Colour scheme is red, with a black nose, and one machine-gun is fitted. Wing span: 29 ft. 3½ in.

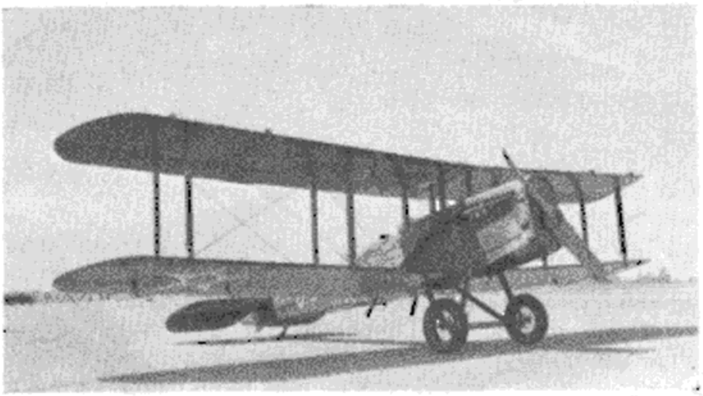
The Nieuport 28 represents an aircraft flown by several World War I American squadrons. It was never popular, because of its habit of breaking up in the air; and this particular aircraft had the forward part of its fueselage covered with cardboard and

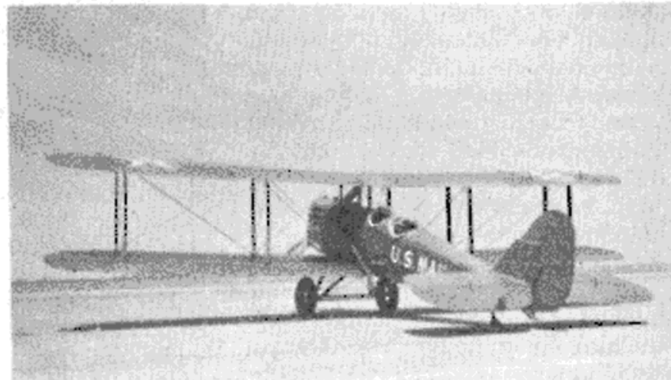
The Nieuport 28, one of the many fine examples of World War I aircraft in the Mantz collection.

Facing photographs

1—Pitcairn "Mailwing"; 2—1910 Curtiss "Pusher"; 3—The "Mustang" with which Mantz won the Bendix Trophy Race in 1948 at an average speed of 447.98 m.p.h.; 4—The Spad; 5—Fokker D.VII; 6—Nieuport 28; 7—D.H.4 Mail Carrier; 8—Grumman "Avenger."







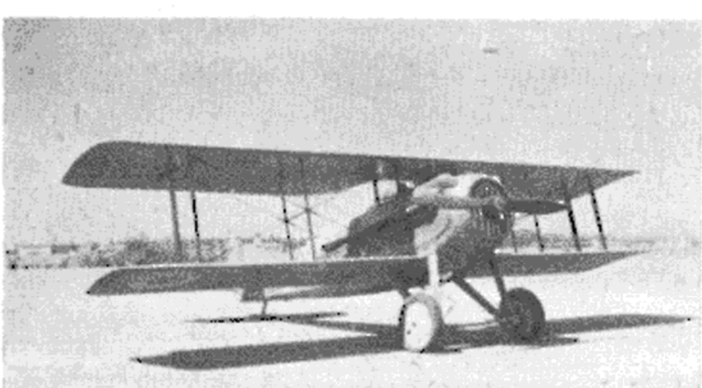
Top: A particularly fine example of the Fokker D.VII, re-engined to keep it in flying trim. Below: The D.H. ET-4 built by Boeing, and still airworthy.

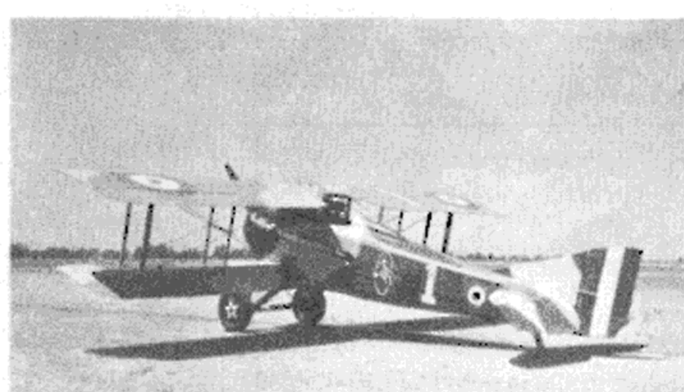
a frail sheet-plywood tail assembly when first discovered. It was stiffened up and fitted with " I " interplane struts for its film career; but has since been converted back to its original struts. Power plant is a 160 h.p. Gnome 9n rotary, giving a top speed of 140 m.p.h. Wing span: 26 ft. 9 in.

Mantz's " 1910 Curtiss Military Aeroplane " is an exact replica of the original and has a plate on it stating: " Parker Curtiss Pusher Model 1912, Serial No.: 101. OX-5 Serial M-3544. Rebuilt 5-4-34." A similar plate on its Curtiss OX-5 engine records: " U.S. Army SC No.: 7945. Factory M-44. Date accepted 1-12-18. Mfd. by Willis Morrow at Elmira, N.Y. Rated at 60 b.h.p." It is covered in orange fabric, with natural woodwork.

The de Havilland model ET-4 was built by Boeing and has a 450 h.p. Liberty engine. It is finished in olive drab colour scheme and is exactly similar to aircraft used by the U.S. Mail service on the notorious " Hell Run " over the Allegheny Mountains in the early 20's. Wing span: 42 ft. 6 in.

Now, Paul Mantz is featured in a current short film entitled " Film Stunt Pilot," and for the price of a cinema seat you can see a fine flying display—some of his work for the movie industry. On the right is a photo of his modified B-25, which he piloted for the hair raising flying shots in " This is Cinerama."





The Spad S. XIII with a serial number close to that of Eddie Rickenbacker's original machine. It can still reach 125 m.p.h.

MODEL AERODYNAMICS No. 6

1. In flight any aeroplane, model or full size, is acted upon by several forces, all of which must be in equilibrium or balance if the flight pattern is to be stable. Apart from stability requirements—which will be discussed later in the series and is largely a matter of relative proportions—the object of balancing an aeroplane is to establish a certain *trimming attitude* in flight. Provided nothing changes, the aeroplane will then assume this trim, or flight attitude, and remain in trim with all the forces acting on it balanced.

The major forces concerned are the weight, acting vertically downwards; the aerodynamic reaction produced by the machine's passage through the air; and, in the case of powered aircraft, the thrust pulling the machine through the air. The aerodynamic reaction is usually thought of as two forces—lift *perpendicular to* the flight path or *airstream* (and thus only vertical, or *exactly* opposed to weight in horizontal flight); and drag acting parallel to the airstream (and, thus, to all intents and purposes, opposite to the applied thrust). Fig. 1.

2. The lift may or may not be produced wholly by the wings. With models it is common practice to use "lifting tails," which means simply that the model is rigged and trimmed so that the tailplane does contribute a certain amount of lift. Fig. 2. The total lift is then a combination of wing and tail lift. With wing lift only, the balance point will be roughly at one third of the wing chord for normal trimming. With the tailplane lifting, the point of action of the total lift is farther aft. Hence a model rigged with a "lifting" tailplane is recognisable by the fact that its point of balance or centre of gravity is well aft of one third of the wing chord, sometimes even on, or beyond, the trailing edge.

3. The total *drag* is contributed both by the wings and the rest of the aeroplane. The former is an inevitable result of producing lift, whilst the remainder of the drag is purely parasitic, and often called by that name—Fig. 3. On the *total* lift and *total* drag characteristics will depend the performance of the aeroplane.

4. Just like an aerofoil, overall lift and drag can be plotted against angle of attack. Lift should remain largely unaffected (except as corrected for additional tail lift), but the drag curve will be higher because of the extra to wing drag now added on.

Now it can be proved mathematically, and demonstrated by practice, that with thrust absent, i.e. the aeroplane gliding, the lowest sinking speed will be achieved when the trim is such that the ratio (lift) to the power of 1.5 divided by drag is a maximum. If we plot this curve ($L^{1.5}/D$) on the graph, as in Fig. 4, it will be seen that this maximum occurs at a high angle of attack.

This means that for minimum sinking speed, the operating angle of attack of the wings must be quite near the stall (1). The way this is obtained in flight is, of course, simply to trim the model until it glides at this required attitude. The practical method is to trim until the model *does* stall, and then just under-elevate it.

5. However, to get the *flattest* glide, quite a different trim is required. The wings must now operate at an angle of attack giving a maximum value of the lift/drag ratio—Fig. 5. This will be a lower angle than 1 and so, to develop the required amount of lift, the model will have to fly faster. By gliding faster, but flatter, it will also descend more rapidly.

Lift plays an important part in both cases. The higher the lift at the trimmed angle of attack, the slower the aeroplane can fly and slow flight is a requirement of "duration" glide performance. Hence, having a large amount of tailplane lift may not be so good in the long run for the tail must be rigged at a lower angle than the wings for stability reasons. Compromises can be worked out, but a modern trend has been to reduce tail-plane area (and thus the proportion of tailplane lift) on gliders and so get back to the point where the wing is providing nearly all the lift.

6. Where speed is the most important requirement, then the object of trim is to fly the model (or full size aeroplane) as near as possible to its minimum drag attitude—Fig. 6. The operating angle of attack (3) is now quite low.

7. Only in the case of a terminal velocity dive (Fig. 7) is wing lift zero—the wing then operating at its angle of attack for zero lift, which may be a small negative angle so that the aircraft is actually inclined past the vertical.

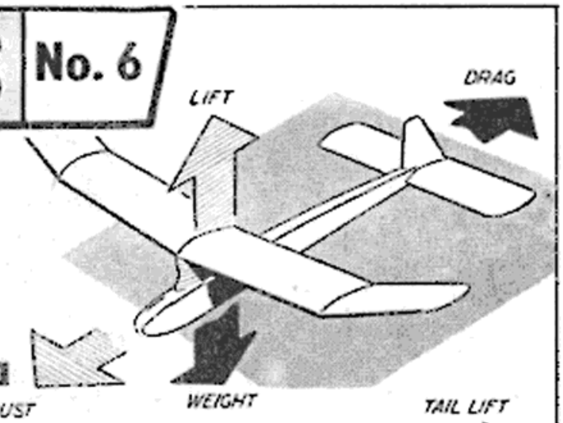
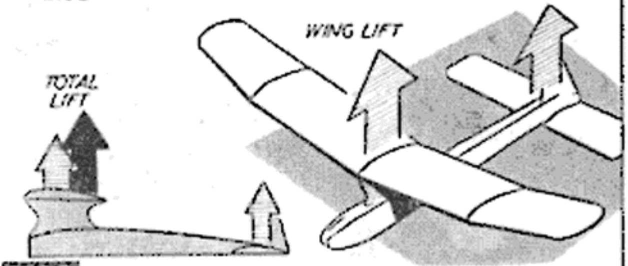


FIG 1



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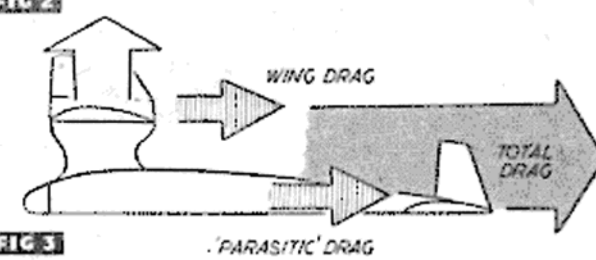

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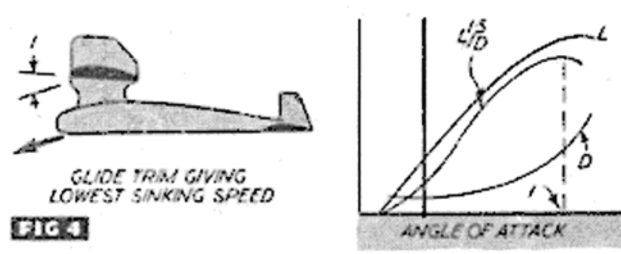
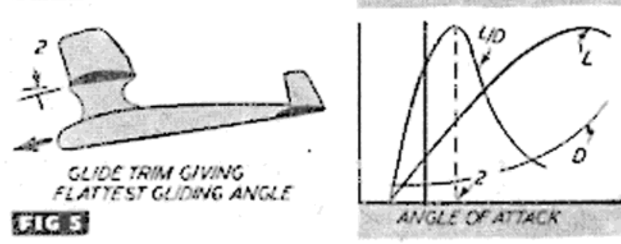


FIG 4



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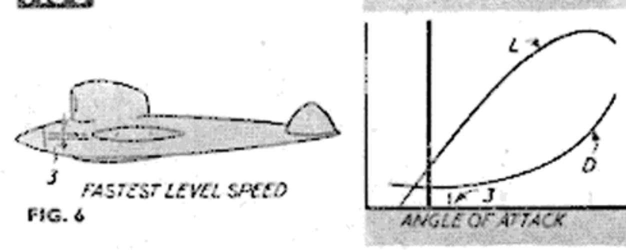


FIG. 6

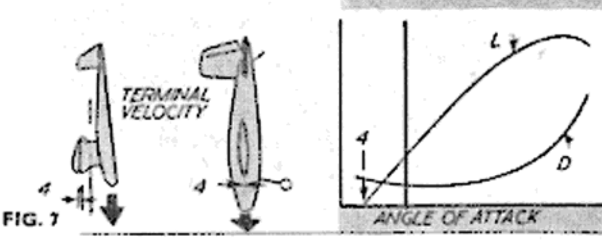


FIG. 7

Aviation NEWSPAGE

by J. W. R. Taylor

The type MG-4 **FIRE CONTROL SYSTEM** fitted to North American's powerful *F-86K Sabre* interceptor does almost everything but cook the pilot's breakfast. Receiving its signals from a radar scanner in the aircraft's black nose-cone, its primary job is to help the pilot locate enemy aircraft at night or in bad weather, and then guide him on an accurate lead-pursuit course which keeps the interceptor pointed slightly ahead of the target.

The system indicates the enemy's range, so that the pilot knows when to fire his four 20 mm. cannon, and is so accurate that "kills" are virtually certain. It also takes the place of the second crew-man once thought essential in an all-weather fighter, by relieving the pilot of navigation problems. Working in conjunction with ground beacon stations, it sends out a signal which "triggers" a beacon, causing it to transmit a coded response. This is displayed on the pilot's radar scope and, by reading off the azimuth and range information, the pilot can identify the beacon and fix his position quickly.

Alternatively, the radar can provide a picture display of the kind produced by British H2S equipment, giving a map-like pattern of the terrain beneath the aircraft. The pilot can then fly a "visual" course by identifying cities, lakes, rivers, mountains and coastal areas on the radar scope.

The *F-86K* is being built by Fiat in Italy as well as by North American, for delivery to NATO countries, including France, Italy and Norway.

* * *

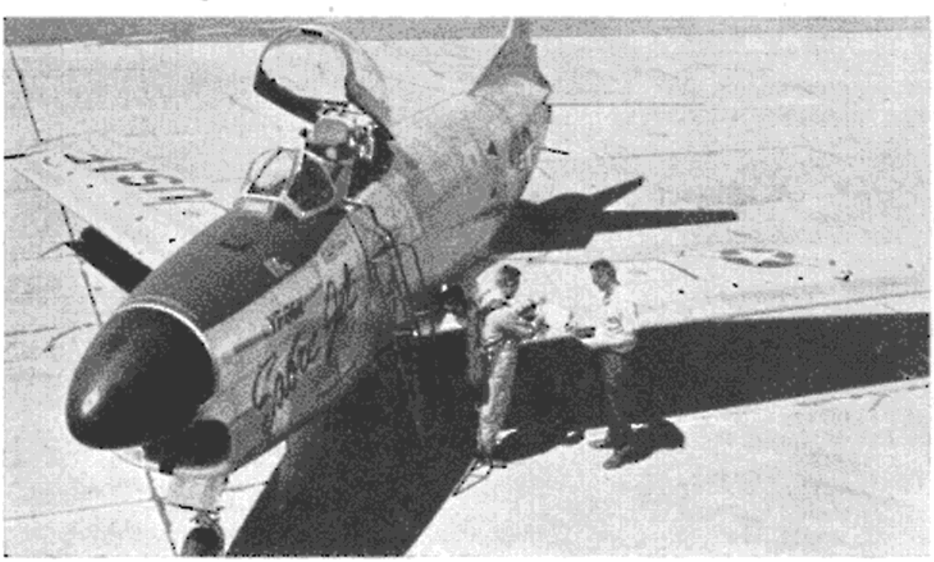
When the **FIRST PRE-PRODUCTION S.O. VAUTOUR** bomber was handed over to the French Air Force, the president of S.N.C.A.S.O. said that it is probably the only bomber in the world that can make its bombing run at full speed (more than 620 m.p.h.), and that it has a range of over 3,100 miles, sufficient to cover the whole of the European theatre of operations. Powered by two Atar turbo-jets, the swept-wing *Vautour* has a crew of two and can carry an atomic bomb.

* * *

The U.S.A.F.'s **2nd AIR REFUELLING SQUADRON,** at Hunter Air Force Base, Georgia, transferred more fuel to *B-47 Stratojet* bombers during flights in January than the average U.S. filling station would pump in three years. Total was 563,270 gallons in 16 flying days. Since its formation four years ago, this squadron has transferred in flight more than 6,000,000 gallons of fuel—2,000,000 from *KB-29 Superfortress* tankers and the rest from the *KC-97 Stratofreighters* with which it is now equipped.

* * *

From India comes news of **RUSSIAN WARPLANE DEVELOPMENT.** Production of the *MIG-15* is said to have been cut back from 320 to 190 aircraft a month last August, and to have ended completely in February of this year. Its place on the assembly lines has probably been taken by the *MIG-17*, with longer fuselage, bigger span wings with rounded tips and trailing edge root fairings. A *YAK-25* is also reported, with thin 45 deg. swept wings and speed of over 780 m.p.h. The big four-jet bomber, known to Western Air Forces as the *Type 37*



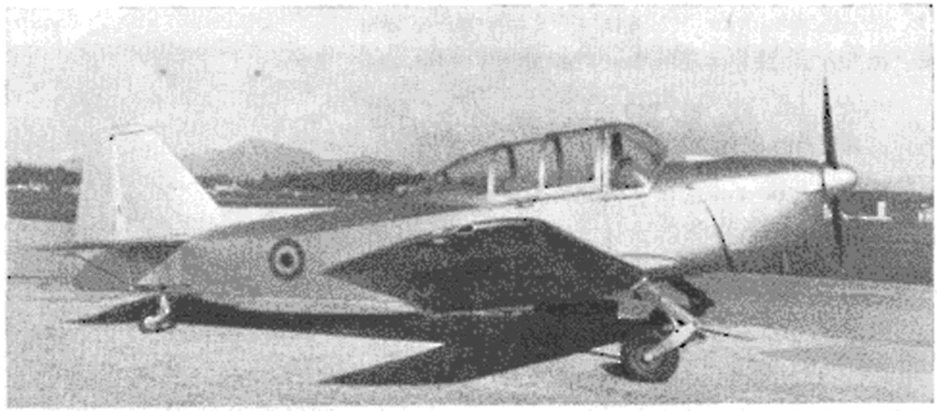
Test pilot Ray Morris checks with a flight engineer before taking up the F-86K "Sabre" on its maiden flight.

Bison, is referred to as the *Molot* and is said to have a range of nearly 4,200 miles.

* * *

Fokker's little **S-11 INSTRUCTOR PRIMARY TRAINER** is not particularly well known in this country, although it is used by the air forces of the Netherlands, Israel and Italy. The Italian machines are built by Macchi under the designation *M.416* and the picture of one of them is shown opposite.

Instructors are also being built in Brazil at the Galeao factory of Fokker Industria Aeronautica S.A., a joint Fokker-Brazilian venture. The first of an initial batch of 100 for the Brazilian Air Force flew in December. Like its European counterparts, it is a side-by-side two-seater, powered by a 190 h.p. Lycoming 0-435A engine, giving a top speed of 130 m.p.h. It can be used for aerobatic, as well as navigation and blind flight training. The Fokker *S-12*, similar except for a nose-wheel undercarriage, will also be built in Brazil, together with the more advanced *S-14 Mach-Trainer*, powered by a Derwent turbojet.



Top: The Fokker S-11 "Instructor," used by the air forces of the Netherlands, Israel, Italy, and Brazil. Bottom: Complete with the dragon emblem, this "Piper Cub" is one of two owned by the S.A.S. flying club in Norway.

* * *

Smallest aircraft to carry the dragon insignia of S.A.S. is the Piper *Cub* LN-PAO, one of two owned by the airline's flying club in Norway. When snapped by enthusiast John Gaylard it had its winter shoes on. Its twin was still complete with wheels, but minus engine, being in the throes of a major overhaul.

* * *

FIRST AMATEUR - BUILT PLANE of post-war design in the U.K. is a two-seat *Turbi* being built by students of the de Havilland Technical School in their spare time. Designed in France by Roger Druine, the *Turbi* has a 65 h.p. Mikron engine and will fly at 80 m.p.h. for about 3d. a mile. This one will cost its makers about £300.

* * *

B.O.A.C.'s 22 **ARGONAUT-CLASS** *Canadair Four* air liners plodded their way quietly to an impressive utilisation record in the 12 months up to April this year. With an average of 3,440 flying hours, each aircraft spent the equivalent of 9.4 hours in the air every day of the year.

* * *

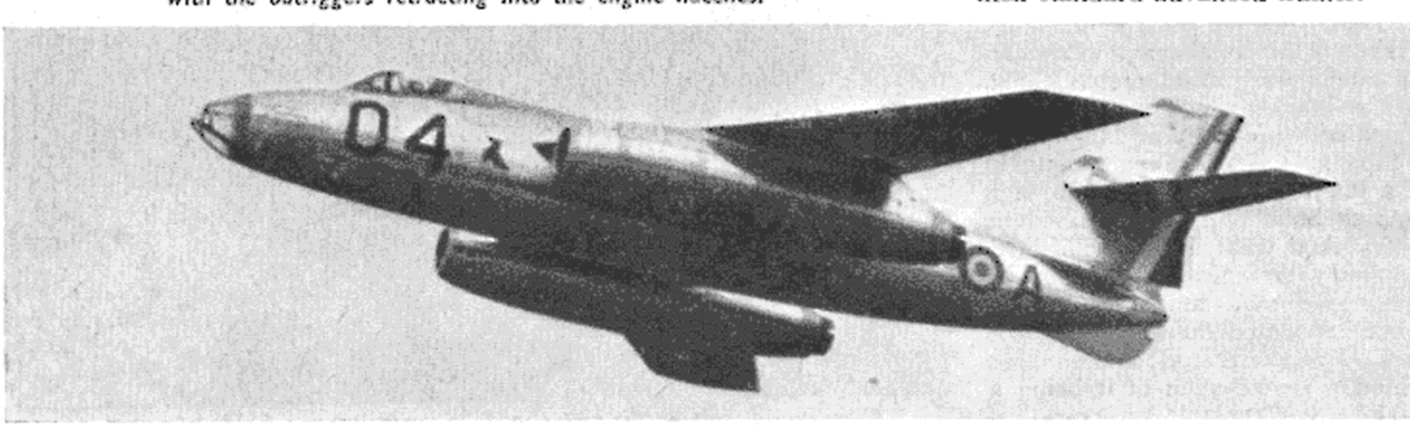
NIGHT INTERDICTOR CANBERRAS will enter R.A.F. service with the 2nd Tactical Air Force in Germany later this year. First will come modified *Canberra B. Mk. 6s*, carrying a gun pack under their fuselage as well as bombs. They will be followed by *Canberra B. Mk. 8s*, with offset fighter-type cockpit canopy, as flown at last year's S.B.A.C. Display.

Night interdiction aims at isolating a battle area or preventing supplies getting through to the enemy, and is similar to daylight ground attack duties. It should not be confused with intruder operations, designed to interrupt night flying activities of an enemy over his own airfields.

* * *

A contract from Finland brings to 17 the number of countries which have adopted the D.H. *Vampire* as their standard advanced trainer.

Below, and in our heading picture, is the first pre-production "Vautour" bomber for the French Air Force. Note the tandem arrangement of the main undercarriage wheels with the outriggers retracting into the engine nacelles.



MORE FLYING SCALE TOPICS

by E. Fearnley

The author with his radio controlled version of Kirby Motor Tutor

To conclude the present short series of flying scale topics, Eric Fearnley illustrates this article on the conversion of a scale model to radio control by describing the radio gear he fitted in his Motor Tutor, the plan of which was published in the May issue.

I WANT to write what may very well turn out to be the first article on R/C which does not tell the reader (*a*) how easy it is to make his own receiver and/or transmitter, (*b*) what such things as Ohm's law, modulated carrier waves, resistors, condensers, anodes, triodes, grids, oscillators are, and expect the average aeromodeller to absorb all this and still remember how to get the model to fly as well.

I will not deal with these matters because I know next to nothing about radio, nor do I want to, beyond the simple knowledge necessary to operate the gear satisfactorily. We must make up our mind right away whether we intend to let radio be the slave or the master of the situation.

If R/C is to be the master, then we will probably be content to do without a model at all for a year or two while we build: (1) a receiver; (2) a better receiver; (3) a poorer receiver; (4) a transmitter; (5) get it to work; (6) build a test meter; (7) find out we have nothing to test; (8) when we come to the stage where we are running out of excuses for not doing any more aeromodelling, and we build a so called " test rig " which proves exactly nothing.

Finally, when we are something of a standing joke at the club, it is time to build a model to save our faces. And what do we build? A soapbox with wings added. Must be strong we say, must be simple. Engine mounted on top, or at the back. Functional stuff; and we hide behind a smokescreen of it being a highly experimental prototype if any rude remarks are passed.

The manufacturers of radio gear went over this ground many years ago, at some cost, to produce a better job, and there seems to be no point in our wasting time repeating the process. It certainly can't be the cost, for it is actually cheaper in the long run to use reliable commercial gear, by the time we have counted the many hours of toil, spoiled batteries, frayed tempers, blown valves, and when we are done we —tht still buy the relay and actuator snuie dearest items of the lot.

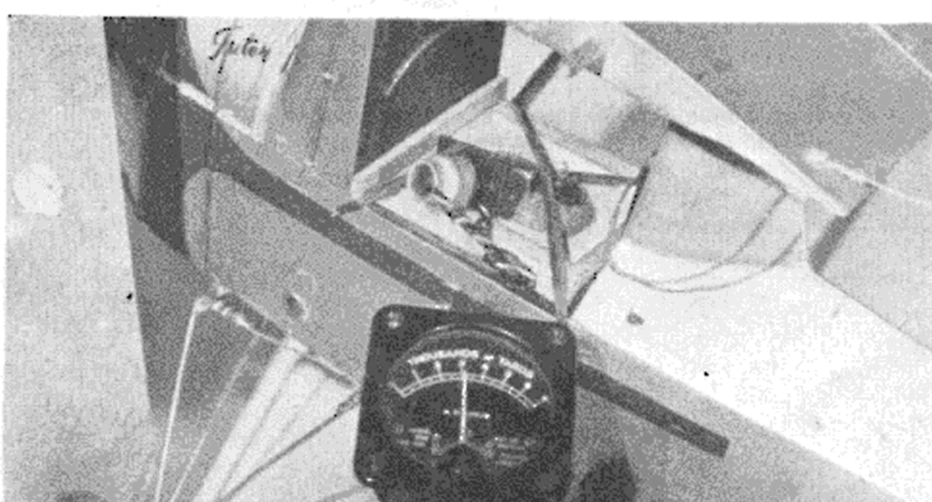
If we are to construct our own radio, why shouldn't we also build our own engine, prop, wheels, or even chop our own balsa tree and saw it up? Surely the radio, like the engine, should be bought as a ready-to-use unit, to fit and forget. The sooner we get to this line of thought, the sooner will we get model aeroplanes flying with radio, and stop building eyesores.

If we are to build flying scale R/C models—the most exacting and patience-testing branch of this or perhaps all hobbies, then the radio must quite definitely take second place. I have found that the trim of the model is far more difficult to accomplish than the radio link. The result of seeing an exact replica of an aeroplane, operating under our own control, is so stimulating that we can overlook our " off " days when we piled up the lot! For no radio flier I know has got off without a crack up or two. But it's all in the game.

If we get a model flying well, it is beginner's luck; if it doesn't fly, it's a case of " told you so, messing about with radio." But whatever the critics say, we get a kick that no other can share, and when the model altered course after the first signal I gave, I was on top of the world.

What is entailed in converting a flying scale model for R/C? It is actually a matter of simple arithmetic to decide whether or not we can do a conversion. The weight of commercial gear is about 10 oz. all up, on the average. Weight can be pruned off this with smaller batteries, but it is asking for trouble to sacrifice efficiency to save a couple of ounces.

Based on 10 oz., then, take two



Although the scale on the meter reads in yards it has a 5 mA deflection.

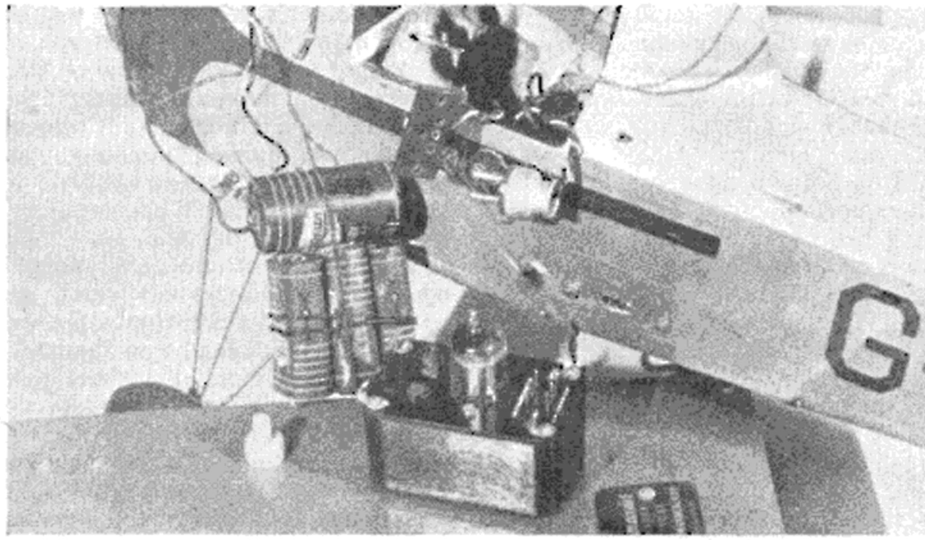
hypothetical models. Model *A* weighs 45 oz. and is about 5 ft. span; flies quite slowly, and the 2.46 engine offers ample reserve power. This is a comparatively easy conversion, because it will only weigh about 25 per cent. more with radio gear in, and will need only a little strengthening to stand the added stresses. It is big and roomy, and fitting the parts is a simple matter. Model *B* is 4 ft. span, and weighs 20 oz., with a 1.5 engine. The loading on this model with a 10 oz. radio will jump up 50 per cent., and considerable re-stressing and maybe more power is needed. Obviously then, conversion of an existing model is easier with the bigger model.

My first conversion was with an old faithful stand-by, a 64 in. span Vultee *Vigilant*, and the weight of the radio made very little difference to the flight path of the model. Except for strengthening up the undercart, and minor trim changes, there was very little required in the way of alterations, and I had the advantage of gaining valuable flying time with a sturdy, but rather sluggish old bird that gave me time to think when operating the controls.

The next model I had in mind for conversion was the *Motor Tutor* described in last month's Model Aircraft. Although it is rather a small model for radio, I felt that it could be converted, as the loading was light. I planned to get the job airborne, with radio, without fitting a more powerful engine than the Allbon Spitfire used for free flight.

We were messing around with condenser discharge actuators at the time, which obviated the use of quite heavy actuator batteries, and I thought I could, with this gear and a home made Sills receiver (made by club member Sam Dowie, not me!), get the lot down to the 8 oz. mark. In practice, as so often happens, this discharge type, while light, will stick on whatever signal was last given if the radio link is lost, and of all the jambs I have witnessed, in every case it has been the right rudder that has stuck. I did this on the *Tutor* after "buzzing" across the tail of another model (justice?) and it came down one mighty wallop—on the runway, of course!

While it proved that the receiver, as mounted, was shock proof, as no radio damage was done, and that the model could take it (damage being limited to what a few blobs of cement could repair). I retired to lick my



The E.C.C. 951B receiver and the H.T. and L.T. batteries beside the Tutor.

wounds and have some long thoughts about pulse-type receivers. Eventually I sent for an E.C.C. *951 b* receiver to go with my hand transmitter that had served me so well. Although this gear needed a heavier actuator and batteries to feed it, and raised the all-up weight a little, I decided that the model would lift the extra weight, as it had gained a fair height with the Sills gear fitted. This receiver works on the more common "drop" type of current change, which means that if the transmitted signal is lost, the controls neutralise themselves. This means a fly away, of course, but surely that is better than a spiral dive from four or five hundred feet?

As anticipated, the Allbon Spitfire engine flies the lot quite well. The original *Tutor*, as presented last month, comes out at little over a pound, and like its big brother, comes in the ultra-lightweight class. That it is strong enough to stand another 10 oz. of radio without any serious alterations gives some indication of the strength/weight ratio of the ordinary free-flight model.

The radio parts have to be fitted so that the centre of gravity is not altered (adding ballast to an already heavy model is bad). The weighty parts are disposed so as not to upset the inertia factors and the stabilising effect of the tail. In addition, it is necessary as far as possible to put the heaviest components at the nose, as in a crash a heavy object will surge forward, and if the radio is at the front, well . . . !

I have already explained how all-up weight can upset the tail action of the scale job. In this case we are increasing the wing loading considerably. Although the total loading of my *Tutor* with radio is only 11 oz. per square foot, a reasonable enough figure for even a non-scale radio job, we have to remember that this is a model of an ultra-light prototype, and as long as the model is ultra-light, we can expect a similar stability. With the addition of radio, the loading comes into the normal class, thus altering the basic characteristics. However, I can assure any builder that the *Tutor* is quite stable at this loading. The tailplane, thanks to the screw adjustment, gives a fine trim, and I have not had any trouble with longitudinal stability. Lateral stability is first class. The enormous wing span actually levels out the model on a tight turn near the ground, due to the ground effect.

Directionally, I experienced some teething troubles, as the model would give an immaculate power flight, only to spin alarmingly on the glide. I added about $\frac{3}{4}$ in. of soft $\frac{1}{4}$ in. sheet to the leading and top edges of the fin to correct this, only to find that the trouble had been a natural built-in left turn on the fin, which I had tried to cure with excessive right thrust. A little right rudder, and one of the packing shims out of the motor front bolts, and it flew straight and true on both power and glide—the goal of all R/C fliers for successful results. (Maybe I should read my own articles!)

The added fin area actually reduces spiral stability—which may be a good thing for radio work—but improves the general flight, so whether it is added or not, I leave to you. It will fly either way, but is probably easier to trim with the increased area.

I do not like altering existing scale form normally, nor with good design is it necessary, but I suppose in the case of a radio model I will be forgiven in this small increase in the fin. Actually, going off the subject a moment, I was surprised to hear from a friend of mine who learned to fly in a Maurice Farman Shorthorn 40 years ago (and has had a go in Tiggies, Ox-boxes, Suitcases and Stirlings in the last war) that in real flight the turn is always more a matter of aileron rather than rudder. When he saw my *Tutor* on the sideboard for the first time he immediately said: "You don't control it with the rudder, surely?" When I assured him it was the thing, he said it was time we tried something more akin to full-size flying technique.

He was most emphatic that to fly a real kite straight and true, and bang on full rudder as we do in a radio job, is the quickest way there is to *spin* the aircraft. The plane skids, and drops the inner wing, as most of the tip lift will be killed instantly. I think he has got something, and hope to try out this theory. This explains why the increase in fin area helps the turn on the *Tutor*.

Getting back to the practical installation, the main batteries are carried in the front compartment as shown in the diagram. In the case of the E.C.C. 951*a* or *b*, this will be three 22½ volt deaf aid batteries in series and a U11 for the low tension current. The makers recommend the D18 l.t., but this will be a little large. It is best to solder a miniature two-pin socket (taken from an old D18) to the l.t. top, so that a spare battery can be fitted on the field.

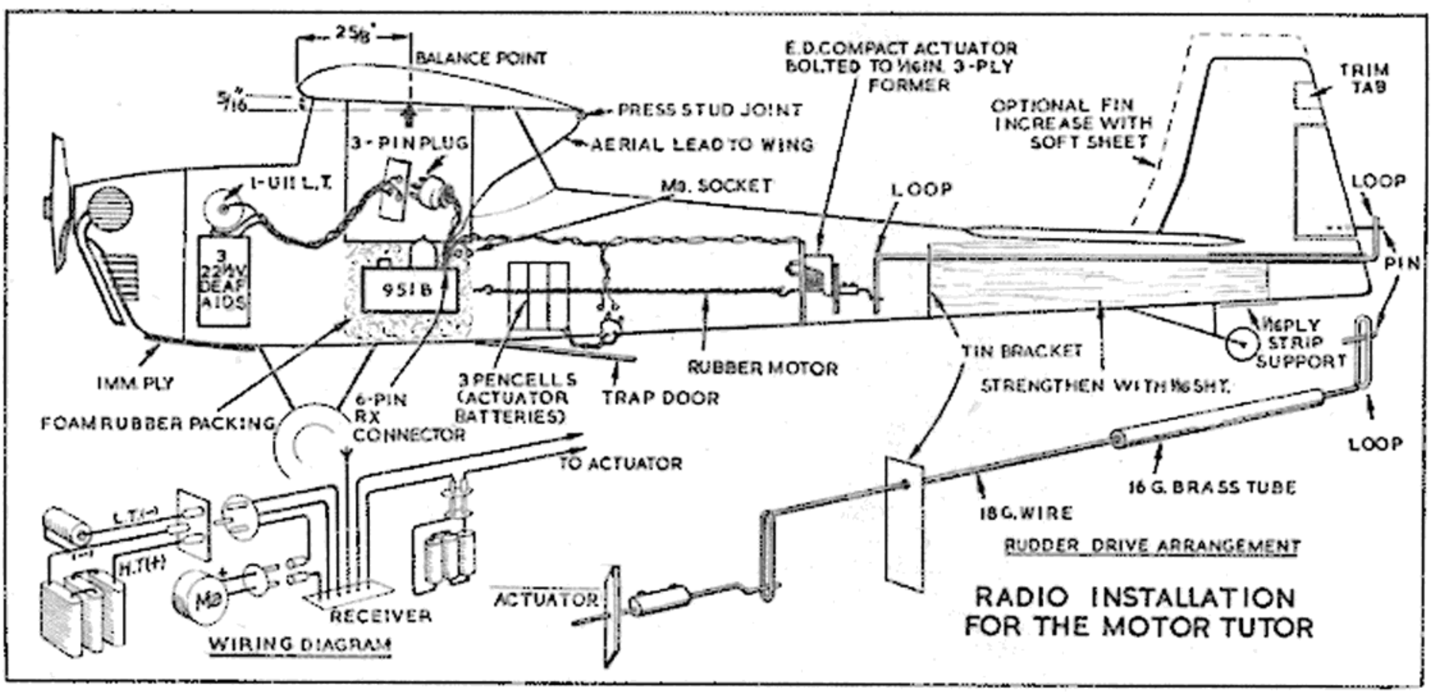
The main batteries are soldered up to three wire leads, which are neatly cabled together, passed through the bulkhead into the cockpit, and terminate in a three pole miniature socket, the appropriate plug for this being wired to the receiver; (tag No. 3 being common negative, tag 6 l.t. positive and tag 1 being the h.t. positive, the latter carrying a two pin plug in the circuit to take the test meter which reads 0-5 mA—the positive being the thick pole, in the case of the 951*b*).

The receiver is carried in the cockpit, suitably nestled in foam rubber. A quantity of clippings of this material is usually obtainable at the local rubber shop for a shilling. A piece of rubber, with a hole cut to accommodate the valve is fitted on top, and covered with a sixteenth ply top, cut, with an oval hole to allow the set to surge forward on impact. This is retained in place by diagonal rubber bands across the corners of the cockpit top. Pack the set quite tightly with rubber on all sides, and bottom. This way it will stand a spin-in, in the same way as did mine. This is a far superior method, and much easier than the traditional rubber band fixing from the corners.

The remaining leads from the set are now fitted. Tag 4 on the 951*b* is the aerial lead, and must be carried away from the high tension wires immediately, or feed back will render the signal weak. Tag 5 is not used in this set up. Tags 2 and 3 are the actuator wires which switch the actuator on and off as the signal is received, and these two leads should be neatly cabled and carried through the rear of the cockpit. Allow a little spare wire for the set's forward movement on landing.

The three pin-plug fitted to the main batteries is used as the main battery switch. A switch can be fitted, but the weight is to be considered. The switch in the actuator circuit is best devised by fitting a two pin-plug in the side of the model opposite to the exhaust in the bay aft of the cockpit. I fit the actuator batteries (three pencells) to a short flex and terminate in a two-pin plug to fit this socket. Thus the actuator batteries can be changed instantly if a spare set is carried.

Remember that the actuator circuit is closed while the set is off, so disconnect the batteries at once after flying. Access to these batteries is through a trapdoor in the bottom of the model. A nylon hinge and rubber bands hold it in place. Due to the small size of the fuselage, and also due to the inertia forces, the actuator is not carried in the tail extremity, but on the last station before the tailplane leading edge. The actuator chosen for the model is an E.D. Compact type. It has not the battery economy or the high standard



RADIO INSTALLATION FOR THE MOTOR TUTOR

of efficiency of the large standard type that I favour, but size dictates using this type on the *Tutor*. It will operate for a considerable time on the three cells if they are changed regularly.

A rubber band is fitted down the fuselage to drive the actuator, terminating in a hook over the trap-door. The recommended loop of eighth rubber is too much—one strand gives ample torque, and enables the actuator to release more easily with less magnet pull.

The actuator rudder link is the most troublesome part of any radio set up and I had many flying sessions spoiled by this component before I finally got a rig that is reliable. Discard any hook-ups on the *Tutor* that require a long rotating crank unless you like fiddling on the field. The set-up now fitted, which I can recommend, is shown on the diagram. You will see that the actuator acts directly on to the torque tube end loop, and it works equally well whether it is exactly lined up or not. The tube through the tail should be 16-g. and the wire 18-g.; the shape of the crank on the actuator governs the amount of rudder movement. In the early stages this should be no more than an eighth of an inch either way. As flying experience is gained it can be increased as long as your nerves hold out!

I don't know whether it is the aluminium dope or the general "smallness" of the model, but the aerial position played me up all ways until I fitted it on the trailing edge of the wing. Numerous types of aerial were tried, but in every case I could not keep up the standing current without signal and at the same time get the proper sensitivity out of the set. Provided this position is used, and the correct length fitted by trial and error, no trouble should be experienced.

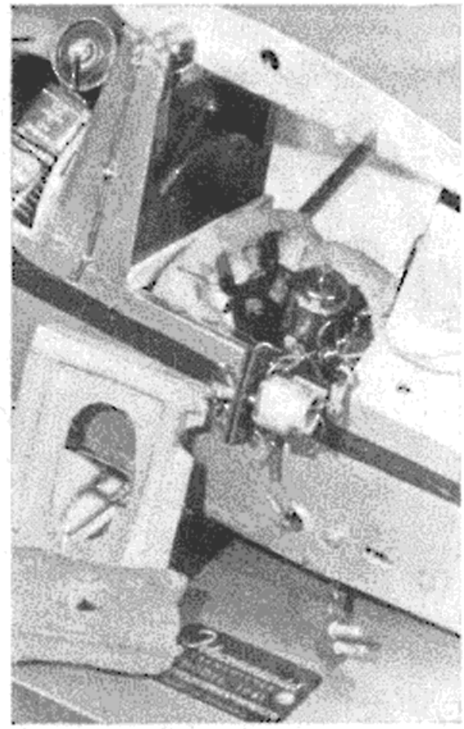
I finished up with enamelled 24-g. copper wire cemented round the T.E. I fitted too much, and clipped it down until I got the maximum range without making it difficult to hold up the standing current, which will happen if the aerial is too short. If it is too long, on the other hand, it will overload the set, and the range will suffer. Quite a critical business on the whole, so don't leave it for the flying field.

If these instructions have been followed, the radio should work O.K. It is now time to modify the trim of the model to cope with the extra weight. If the model has been flown without radio, very little change is necessary.

Take out the $\frac{1}{8}$-in. wing packing which is fitted, substituting a $\frac{1}{16}$-in. piece. This increases the wing incidence so that there is now a $\frac{5}{16}$-in. drop from the front to the rear of the centre section in relation to the top longeron.

The tailplane now requires a similar increase in incidence, so $\frac{1}{16}$ in. is added to the leading edge by screwing up the adjustment. The result of this is that the glide should be exactly the same as before, but under power the model will head for the horizon, climbing only about 20 ft. in a wide circle. As a power run is considerable on radio, this will keep the model low enough for comfort, and at the same time eliminate all tendencies to stalling, which produces the resultant loss-of-rudder effect, until the model finally turns, and the sudden increase in flying speed whips the tail round, and before you can say "Honnest-Redlich," your number is up!

It only remains to straighten up the power run with small shims under the motor lugs, and the glide with trim tab adjustment, so that we get a straight power and glide flight. That about sums up the lot, except to say that a penn'orth of experience is worth a pound's worth of theory.



The receiver positioned in the cockpit.

IMPROVE YOUR COMBAT

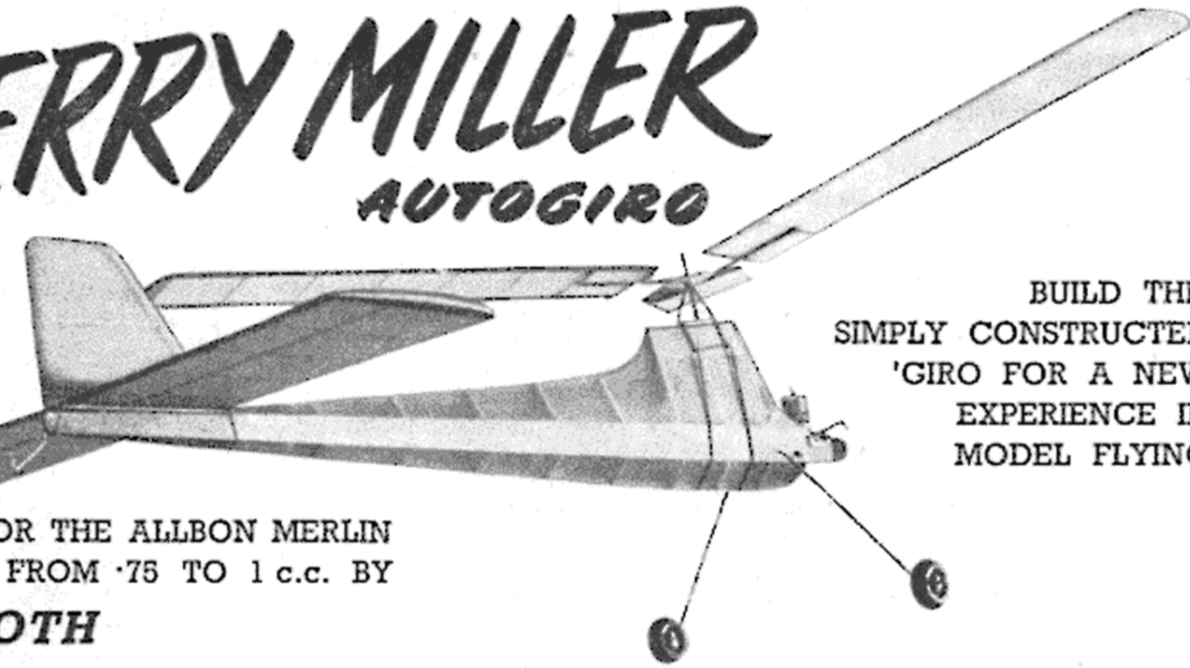
(*continued from page* 219)

In stunt flying—taking the loop as an example—the idea is, of course, to do one, then put the other four in the same "groove," as the original. In combat there is one thing you must *not* do and that is to fly "neatly"—nothing makes it easier for your opponent than to know that you will recover from a manoeuvre in exactly one spot. Obviously, then, stunting ability is a necessity if you are to become a good combat flier. Remember, the crazy flying displays put on in full size machines are all done by *expert* pilots. Further rules for combat flying come in all "shapes and sizes," and controversy has raged in many a club room. Up here in the Northern area we held a little quiz among contest winners to sound out their views. Eventually, it was decided to have two classes—up to 2.5 c.c. and up to 5 c.c., with a line length of 39-40 ft. for the former, and 49-50 ft. for the latter. Streamer lengths were 6 ft. and 9 ft.; tied to a string 1 ft. and 1 ft. 6 in. respectively. The rounds would be of eight minutes, and if resulted in "no score," would become a fresh start.

The scoring system caused many headaches, and evolved around the amount of streamer to be cut—the string counting as part of the model—and similar "finer points."

Now we are on the start of yet another season's flying and much speculation arises on what the "other chap" is doing. Finance plays no small part in planning your programme for the season and progress can be helped along considerably by the use of certain refinements. For instance, it's nice to have a "BB" (if expensive) for each job, and a great help is the "U-Reely" control handle [described in the April issue—Ed.]. But these sort of things take money, and many helpful features are completely inexpensive—such as sticking sandpaper along the leading edge of the wing to make sure your opponent's streamer doesn't slide off when it comes into contact. There are other little "dodges," all of which come with experience, and the way to get experience, of course, is to fly combat as often as possible and I hope that these notes will at least help you on the way.

THE MERRY MILLER AUTOGIRO



BUILD THIS SIMPLY CONSTRUCTED 'GIRO FOR A NEW EXPERIENCE IN MODEL FLYING

DESIGNED FOR THE ALLBON MERLIN OR ENGINES FROM ·75 TO 1 c.c. BY

RAY BOOTH

ALTHOUGH the writer's name is more generally associated with free-flight scale and tail-less models, we all have the urge, at come time or other, to build and fly something different.

Just before the war the Cierva Autogiro rotary wing aircraft became a familiar sight in Britain and certainly paved the way for the helicopter of today. From the model maker's point of view the autogiro has one particular aerodynamic complication, and that is the difficulty of balancing out the lift of the upwind and downwind blades of the rotor as they rotate with forward movement of the aircraft. The model helicopter, with its vertical ascent and descent (we hope!), neatly slides round the trick asymmetry of lift which characterises the model autogiro. However, the writer felt that plain straight up and down flight was likely to become rather dull, so consequently the autogiro was the final choice. The model depicted here is the second of the series and virtually flew "straight off the drawing board." With a little care and thought during the initial stages of test flying, a really reliable model, capable of flights in weather which would ground more conventional types, will be your reward. With the possible exception of the rotor hub assembly, the model is simple to construct and will stand up to really hard knocks.

Fuselage

Transfer the various former shapes on to $\frac{1}{8}$ in. sheet balsa and cut to size. Note, that the front bulkhead, F1, is laminated from balsa sheet $\frac{1}{8}$ in. thick and $\frac{1}{16}$-in. ply. Remember, it may be necessary to revise the location of the engine bearers to suit the particular engine used, and this will accordingly have some bearing on the position of the rectangular holes.

Cut the fuselage sides from $\frac{1}{16}$ in. hard sheet balsa and carefully mark the various former positions. Cement F1, 2, 3, 4 and 5 to one fuselage side, ensuring that, as the cement dries out, the formers remain vertical. When cement has thoroughly hardened, cement the other fuselage side into position and leave to set. When dry the remaining formers may be fitted in their respective places, joining the sheet sides together at the rear end. The $\frac{1}{4} \times \frac{1}{16}$ in. stringers may now be added to the top and bottom of the fuselage, along with the $\frac{1}{16}$ in. sheeting between F2 and F4 for the rotor hub mounting. Next, thoroughly cement $\frac{3}{8} \times \frac{1}{4}$ in. hardwood engine bearers in place and when set, drill carefully to take 16-s.w.g. undercarriage tubing and stiff paper tube, which pass right across the fuselage. Add the 1 in. wide $\frac{1}{16}$ in. sheet platform at the tail end, also 1/32nd sheeting at the nose. Finally, add tail skid and celluloid to windscreen.

Tail Unit

Pin down over plan the various items required to construct the fin, cementing the joints carefully. When dry, remove from plan and sand the leading and trailing edges to the sections shown on the drawing.

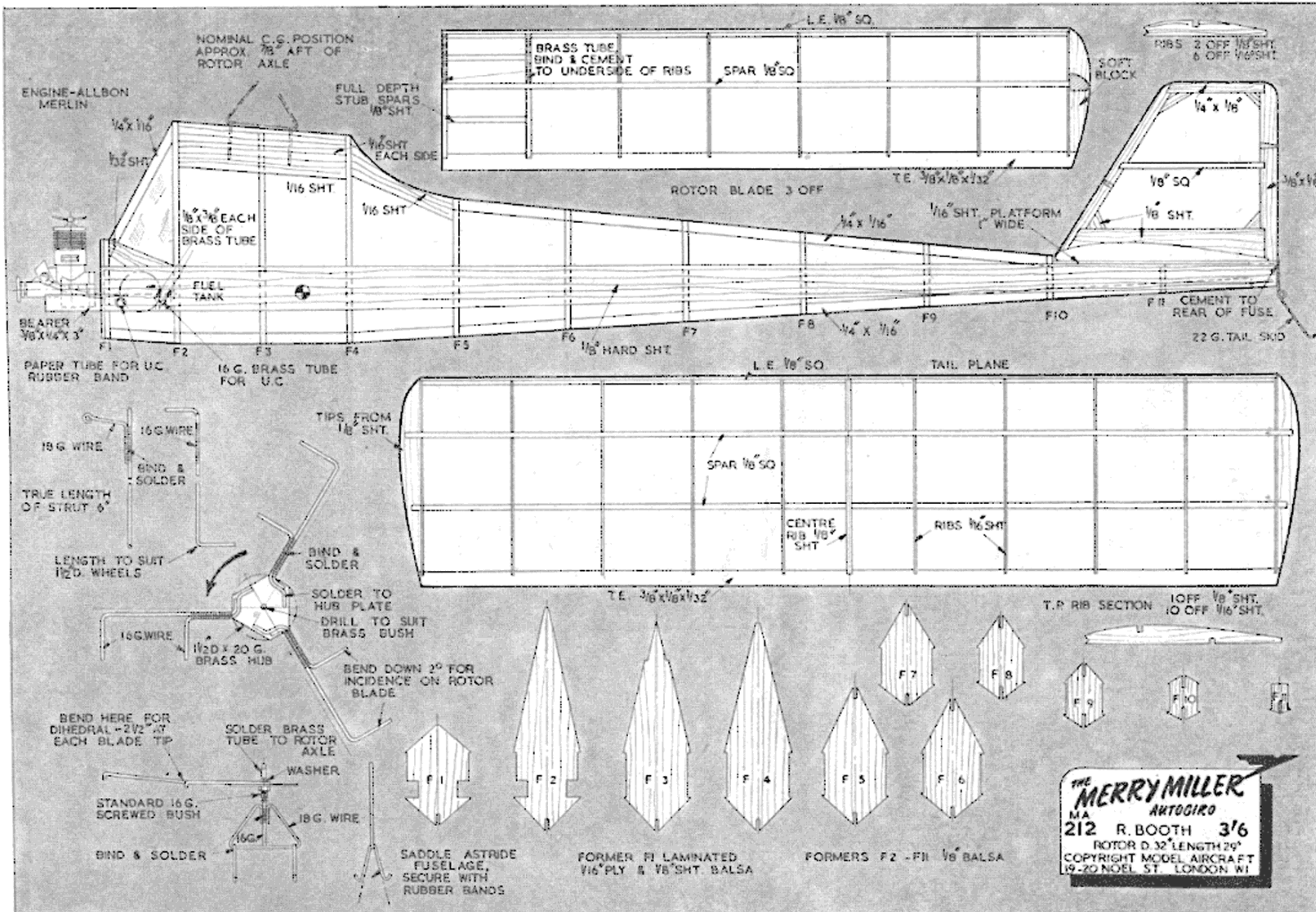
The tailplane is constructed in the conventional manner by pinning down on the plan first, the trailing edge, then the $\frac{1}{8}$ in. sq. hard rear spar, followed by the ribs (10 from $\frac{1}{16}$ in. sheet and one from $\frac{1}{8}$ in. sheet). Allow to dry before adding front spar ($\frac{1}{8}$ in. sq. hard balsa) and leading edge ($\frac{1}{4}$ in. sq. set diagonally). Tailplain tips are from $\frac{1}{8}$ in. sheet and should be sanded after removal from plan.

Rotor Blades

Three blades are required. Construction is similar to the wing. Pin down over drawing first the trailing edge, then the ribs (noting that the two inboard ribs are cut from $\frac{1}{8}$ in. sheet and the remainder from $\frac{1}{16}$ in. sheet). Next add the $\frac{1}{8}$ in. sq. hard balsa spar, then the diagonal leading edge. Blade tips are from balsa block, but may, if desired, be laminated from $\frac{1}{8}$ in. sheet to the appropriate thickness. Stub spars between the two $\frac{1}{8}$ in. sheet root ribs should be cut from $\frac{1}{8}$ in sheet to form "full depth" spars. *On no account should the 16-s.w.g. brass tubing be fitted to the rotor blades at this stage.*

Rotor Hub Assembly

The importance of taking extra care with the construction of this unit cannot be over-emphasised. With a pair of dividers mark a circle $1\frac{1}{2}$ in. diameter, then carefully mark off the 120 deg. lines. Using a scrap piece of flat board at least 7 in. sq., pin down the plan view of the rotor hub to simplify alignment of the rotor



FULL SIZE WORKING DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT 19-20, NOEL STREET, LONDON, W.1, 3s. 6d., POST FREE arms during assembly. Carefully make up three sets of double rotor arms as shown on the drawing, ensuring that they are all identical in size and shape. Bind the rotor arms in pairs and solder thoroughly. Next pin down the shaped brass hub plate directly over the drawing with pins round the outside edges to prevent any movement during the subsequent soldering operation. Pin down the rotor arms in their respective places and when satisfied that they are perfectly aligned with their drawn counterparts, solder arms to brass hub with extreme care. Allow to cool, then remove from plan and test that soldered joints are firm. Remember that the life of the model may depend upon these soldered joints, so do not be afraid to give them a thorough testing. Should one of the joints fail, pin down the hub and re-align the rotor arms, then re-solder the faulty joint. It is better to take this precaution than risk the loss of the model and possible serious damage to the engine itself, by a rotor blade coming adrift in flight.

When satisfied that all the soldered joints are secure, place the rotor hub on a flat, raised surface (a block of wood about ½ in. thick and 1 or 2 in. square will suffice) and stand this on a flat surface such as a table or building board. Bend *down* the forward facing prongs of the rotor arms to an angle of 2 deg. To check this angle cut a piece of thin card or balsa sheet with a 2 deg. slope on it, the actual depth of the strip being dependent upon the height of the block the hub is standing on and fit this strip below the six prongs in turn. Bend each prong until the appropriate 2 deg. has been obtained. Dihedral angle should next be added by bending up the outer arms as shown on the drawing. The wire, hub mount can now be made up from 18-g. and 16-g. piano wire, and the brass bush and washers fitted in position. The hub is retained on the mount by soldering a short length of 16-g. brass tubing to the 16-g. wire axle, allowing about 0.020 in. "play" in the hub bush.

At this stage the 16-g. brass tubing should be attached to the rotor blades. Now mark the rotor arms "1" "2" and "3" respectively on the hub plate for future reference. Slide the appropriate length of 16-g. brass tubing on to the two prongs of arm No. 1 and whilst thus retained, bind and cement the tubing to the two ⅛ in. sheet root ribs. When set, remove rotor arm and remember to mark the rotor blade "No. 1" on the root rib (inboard face) for reference. Repeat procedure for other two blades. Cement all thread binding a second time to ensure that tubes are firmly attached to ribs.

Construct the undercarriage from 18-g. and 16-g. piano wire as shown on the drawing. When structure of the model is completed, cover tailplane, fin, fuselage and rotor blades with lightweight Modelspan. Water shrink in the usual manner and when dry, give fuselage three coats of clear dope, rotors and tail unit two coats.

Flying

Initial test flights should obviously be carried out in calm weather, in fact, flying the model in windy weather should be restricted until sufficient experience has been acquired with the trimming characteristics of the rotary wing aeroplane.

Assemble the model with the rotor mount positioned as indicated on the plan, and ascertain the model's c.g. location. If it does not coincide with the plan, move rotor assembly until c.g. is approximately ⅞ in. aft of the rotor axle. It will be appreciated that test *gliding* is out of the question on this type of model, so with the engine running at roughly half revs., run forward with the nose of the model held up in a 15 deg. climb attitude. As the rotor blades gather rotational speed the model will tend to lift out of the hand and at this instant—and not before—the model should be released. It is advisable to restrict the engine run to about 8-10 sec. during early flying tests.

No attempt should be made to THROW the model forward during launching, and it should be emphasised that it is important to keep the nose of the model UP whilst running forward prior to launching. Immediately the machine is airborne take particular note of any tendency towards a left or right hand roll combined with some degree of turn. This characteristic indicates that the lift of the advancing and retreating blades is not balanced out correctly.

If, for example, the model tends to roll to port (left), this shows that the ADVANCING blades are generating too much lift. To cure this, remove rotor blades from hub and, bend the prongs *down* slightly, thereby changing the incidence from —2 deg. to —2½ deg. Replace blades in their respective places on the hub and repeat launching procedure. If the model should possess a desire to roll to the right, this indicates that the retreating blades are providing too much lift. To correct this, remove blades from hub and bend the prongs UP slightly, thus changing the incidence from —2 deg. to —1½ deg., replace blades and launch again.

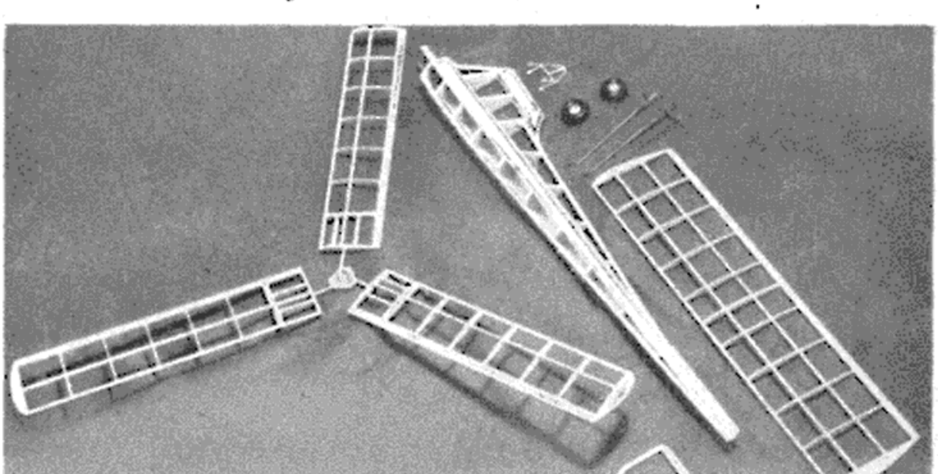
After a few flights this rolling characteristic will soon be mastered. The important thing to remember is to carry out trimming changes a little at a time.

If the model flies straight but does not climb, increase engine speed slightly and try again. If this proves unsuccessful either move the rotor mount forward and/or pack up the trailing edge of the tailplane with ⅛ in. sq.

Should the model try to climb vertically, check c.g. position and if found correct, move mount slightly rearward (approx. ¼ in.). If this does not prove satisfactory, pack up leading edge of tailplane with ⅛ in. sq.

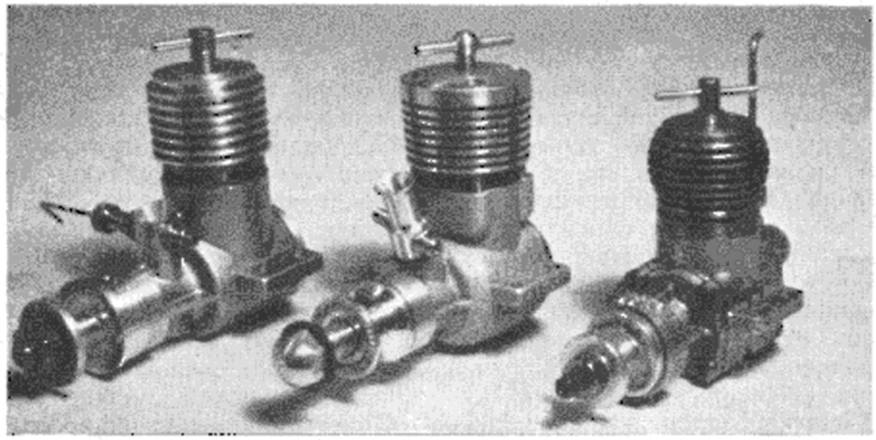
When correctly trimmed, the model may be safely flown in weather which would keep other models packed up in their box!

R.O.G. flights should not be attempted except in windy weather.



The basic components of the "Merry Miller."

DISCOURSE ON 2·5's



The most powerful 2.5 c.c. engines currently available in Holland, Britain and Germany are, respectively, the Typhoon R.250, Oliver Tiger Mk III, and Webra Mach-I. All have twin ball bearings. The compact dimensions of the Mach-I are apparent in this illustration.

ACCENT ON POWER
by
P. G. F. CHINN

WITH the selection of the F.A.I. Class "I" engine capacity for determining this year's World Speed Championships, the 2.5 c.c. engine achieves its "double," for it will now power both the World Free-Flight Championship winner and the World C/L Championship winner.

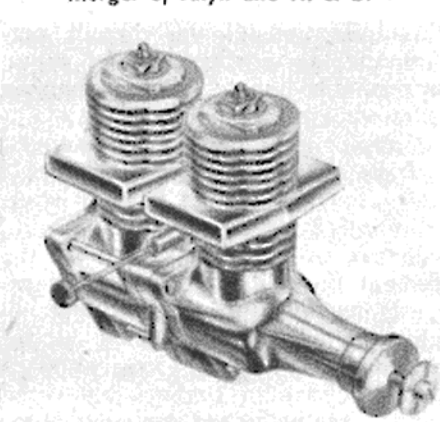
The emergence of the 2.5 c.c. unit as the "Formula 1" engine of the model aircraft world is, we feel, a good thing on several counts.

Firstly, the 2.5 c.c. capacity is the approximate size which is conveniently adaptable to all kinds of models, both contest and otherwise. This can mean that World Championship models need not be so widely divorced from popular types as would be the case if a less popular engine size were adopted.

Secondly, it is the size with which Europeans, in particular, are most familiar and which, in Europe, has been brought to a higher stage of development than any other capacity.

Had a 3.5 c.c. or 5 c.c. class been adopted for international competition, in place of the 2.5 c.c. unit, there is no doubt that the World Championships power events would have been entirely dominated by American entries, or by models powered with American engines. While there is every credit due to American manufacturers for producing engines which are unbeaten in their respective classes, the absence of an effective challenge from Europe and elsewhere would, undoubtedly, have removed much of the interest attaching to international competition, as the Americans themselves would readily admit, and, inevitably, would have resulted in reduced status for such events. It is extremely doubtful whether European manufacturers, especially if the 5 c.c. class had been adopted, would have been encouraged to spend time and money on the development of an engine aimed at beating the Americans, knowing that the sales of such units would be quite small.

The Allyn Sky Fury .099 cu. in. Twin two-stroke engine mentioned in last month's "Accent on Power." It will be manufactured by a new company formed by the merger of Allyn and K. & B.



As things stand at the moment, Europe, after a head start in 2.5 c.c. competition engines, is still in a strong position. The fact that the American K. & B. Torpedo 15 engine was the winner at both the 1953 and 1954 World Free-Flight Championships, by no means proves the superiority of this engine; it only suggests that the best use has not yet been made of available European engines.

There is no doubt that the K. & B. Torpedo 15 is a very good performer. It is also obvious that American free-flight experts known how to use the Torpedo's power. The idea that the Torpedo 15 does not produce a diesel's torque is fallacious. In fact, it can produce a torque which equals that of most plain bearing shaft-valve diesels and since it is capable of sustaining such torque at high r.p.m., it will deliver a peak output slightly better than the average 2.5 c.c. diesel.

Nevertheless, there are at least two 2.5 c.c. European engines which, on the strength of bench performance, should be capable, especially in a free-flight model, of out-performing the Torpedo 15. These are the British Oliver Tiger Mk. III and the German Webra Mach-1. Both reach a higher b.h.p. than the Torpedo 15.

The Torpedo, however, scores on two points. Firstly, most operators find it easier to start, on small, high-speed props, than a diesel and are thus encouraged to use its peak performance. Secondly, it enjoys a very considerable advantage in the fact that the glow-plug ignition process has a sort of built in automatic advance and retard, whereas the ignition timing of a diesel (i.e., compression-ratio adjustment) must be pre-set in accordance with the estimated optimum setting in the air and under reduced load—a very much less positive process.

It is probable that this latter point, which, hitherto, has been thought to be only of any consequence in the case of speed models, is, in fact, of some importance in high-performance free-flight models also. As for the question of startability—or the lack of it—on small props, this has, no doubt, been responsible for a reluctance on the part of diesel owners to utilise full performance by running such engines at speeds more nearly corresponding to their peak outputs.

There is one other factor which also calls for attention when endeavouring to extract full performance from a diesel and that is rigidity of mounting and the avoidance of loss of power through vibration. Efforts should be made to ensure, by adjusting load and attention to mounting, that the engine does not enter a vibratory period, either at its peak airborne r.p.m. or in the transition range between static r.p.m. and airborne r.p.m.

Vibration is not merely an unpleasant condition which causes mounting bolts to loosen. It is, as has been previously pointed out in these articles, a source of very serious loss of power. No movement can be effected without the expenditure of energy and to cause an engine, mounting and airframe to vibrate, must necessarily absorb power from the engine, which, in turn, means that less power is available at the crankshaft.

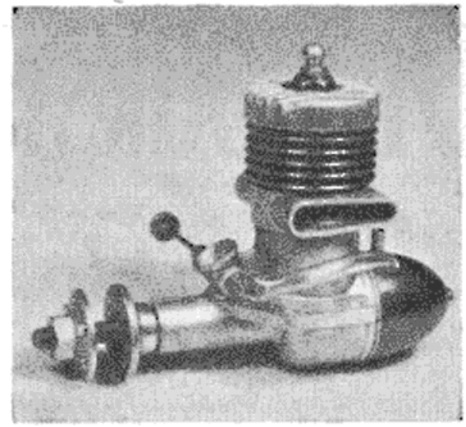
A simple demonstration of this fact can be seen in any airframe or bench mounting which permits an engine to vibrate, especially if, the structure of the mounting or airframe is such that serious oscillations are present in the latter. In such cases, severe vibration will be accompanied by a clearly audible drop in engine r.p.m. by as much as 10 per cent. (equal to a power loss of 27 per cent.). If, however, the mounting is now grasped firmly, the engine note will rise to its former pitch as vibration is reduced.

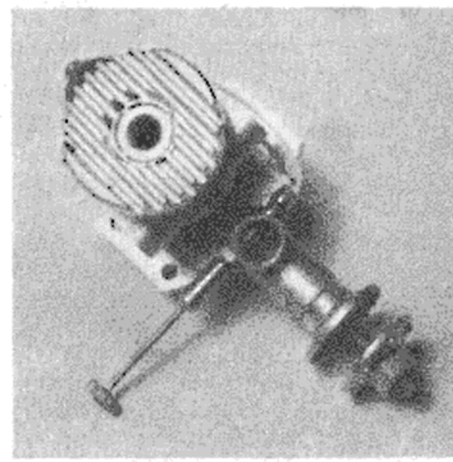
Generally, vibration periods are more commonly found at speeds well below the peak of the power curve, which is another reason for avoiding oversized props. It is, however, conceivable that an engine which, on the ground, is running at a moderate speed without sign of excessive vibration, will, on becoming airborne, enter a vibration period as it accelerates and may then stay in this condition, with consequent loss of climbing speed; the only way out of the period being by increased airspeed—i.e. levelling out or a dive.

To return to our original theme, however, it is our personal view that, if the operational problems involved in successfully applying the bench performance of a diesel to actual flight conditions are appreciated, a free-flight model powered by an Oliver Tiger or Webra Mach-1 should still be capable of exceeding the performance of a similar model using a K. & B. 15.

In practice, this means (*a*) running the engine at somewhat higher speeds than has been generally adopted for diesels, (*b*) paying particular attention to mounting, (*c*) eliminating any possibility of vibration in the range of speeds between static and airborne r.p.m. and (*d*) ascertaining, by constant experiment and practice, the compression setting required to give the best performance in the air.

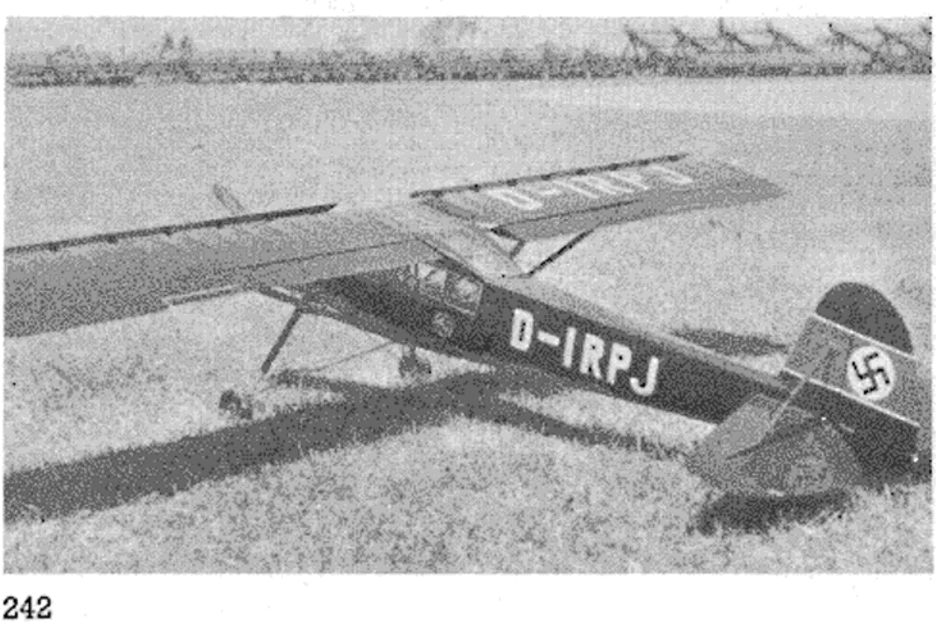
In the case of the two diesels mentioned, high speeds do not pose any unduly difficult operational problems and the Mach-1, in particular, is quite remarkable for the manner in which it can be hand started on small props, even with the controls set in running positions. As regards mounting, the idea is to get the whole nose section as rigidly tied together as possible and to avoid willowy structures.





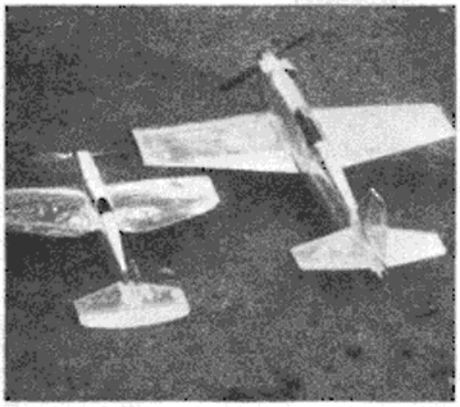
The entry of Japan into the 2.5 c.c. class is marked by the new Fuji 15 glow plug motor shown in these two views. Lower picture clearly shows the unusual cylinder construction, in which the head is integral with the cylinder and a finned alloy die-casting is fitted to a raised plug boss.

Spanning more than 6 ft., this Japanese scale control line model Fieseler "Storch" weighs some 9 lb. and is powered by a 10.5 c.c. O.S. engine, with speed control.



The position in regard to 2.5 c.c. speed applications is somewhat less happy. The disadvantages of lack of precise ignition timing and of the need for greater airframe mass to combat vibration, militate against the full utilisation of the diesel's performance in a speed model to an appreciably greater extent than in other types of aircraft.

Despite their high bench outputs, neither the Tiger, nor the Mach-1 has, to the writer's knowledge, substantially exceeded 100 m.p.h., whereas up to 118.35 m.p.h. (the present Super-Tigre held world record) has been reached with glowplug engined models. It would appear that, for an identical rated power, glowplug engined 2.5 speed models are up to ten per cent. faster



Two team-racers from Germany, unusual in the fact that they are both covered with "Klebmetall" aluminium sheet.

than the diesels. It is certainly not unusual to find that a glowpug engine which is inferior in output to a similar displacement diesel when bench tested, turns out to be faster in the air in a speed model.

Some support for the theory that the high combustion pressures of the diesel, allied to the inadequacy of a small airframe as a means of controlling resulting vibration, are partly responsible for its inferiority in speed work, is seen by the performance of diesels in model cars. Up to the present time, the Oliver Tiger has proved virtually unbeatable in the 2.5 c.c. model car class, quite outpacing the 2.5 glowplug models, despite efforts by some very capable Italian exponents of the Super-Tigre G.20S. Here, of course, the engine is carried in a rigid metal chassis. (It may be suggested, here, that some increase in performance can be attributed to more efficient crankcase cooling due to the effective dissipation of heat through its transference to the chassis, but, obviously, this is not such as to produce any marked improvement over an efficiently cooled aircraft installation.)

The answer, for the present at least, would appear to be glowplug conversion of existing high performance European diesels—where such engines are suitable for conversion. Peter Wright has already shown how the E.D. 2.46 can be turned to good account for speed work by conversion to glowplug ignition. The manufacturers of the Mach-1 have also produced a few glowplug versions of the Mach-1, and one or two examples of this are expected to be seen at the World C/L Championships in Paris on May 29th-30th. The other principal contenders at this meeting are likely to be the Torpedo 15 and Super-Tigre G.20S.

The outputs realised by these four models, when tuned for speed work, should be in the region of 0.30 b.h.p. plus, at speeds ranging from 14,000 to 17,000 r.p.m. However, there is one factory development (the name of which we are not at liberty to divulge at the present time), for which an output of no less than 0.37 b.h.p. has been claimed.

This, equal to a specific output of 150 b.h.p./litre, is a figure which, until now, has been reached only by larger engines of the Dooling calibre. If the 2.5 c.c. formula is retained for future World Championships events, it seems likely that the next few years will see the development of 2.5 c.c. units having up to 50 per cent. greater output than the average production 2.5 currently available.

In Brief . . .

Until recently, Japanese engine capacities have closely followed the American classes, but two 2.5 c.c. engines have now appeared, the Fuji 15 and Mamiya 15. One of the former reached us shortly after its release in February. The Fuji is a low priced unit and does not teach us anything about high performance. It is, however, an interesting example of the Japanese approach and bears little resemblance to any Western product of similar size.

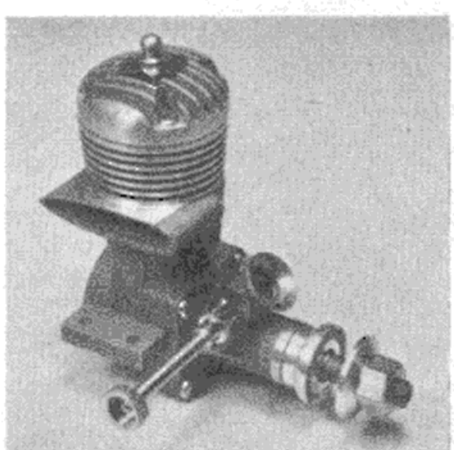
The most unusual feature of the Fuji is the cylinder, which is a radially ported component screwing into the crankcase casting and has integral turned fins *and head*. The latter has a raised boss surrounding the plug hole and a finned alloy diecasting is fitted over this and pinned in position. Non-detachable cylinder heads were featured on some early model engines but are now seldom seen, the only mass-production engines to use them during recent years being the Ohlsson & Rice models.

New O. & R. Engine

Mention of Ohlsson & Rice brings to mind that Harry Rice has just introduced a new model, the first new O. & R. engine for some seven years. This model justifies being called entirely new because not only is it a marked break away from previous O. & R. engines; it is also an unconventional design which bears little resemblance to current engines of similar size. Known as the "Midjet," it is a "Half-A" class (0.8 c.c.) unit, which, like the Cox Thimbledrome 0.049, breaks away from the usual shaft-valve radial port layout so popular in this class. We hope to give a full technical description of this unit in the near future.

New Enya 29

Another Japanese engine to reach us with the Fuji, was the Enya 29 model. In general, this engine resembles the smaller, Enya 19 which was featured in the March MODEL AIRCRAFT "Engine Test." It is of 4.82 c.c. capacity, bore and stroke being 19 mm. and 17 mm. respectively. Like the 19, it is a sturdily built engine, nicely finished, which handles well and has a useful performance. The Enya is recognised in Japan as being one of the best engines produced there.

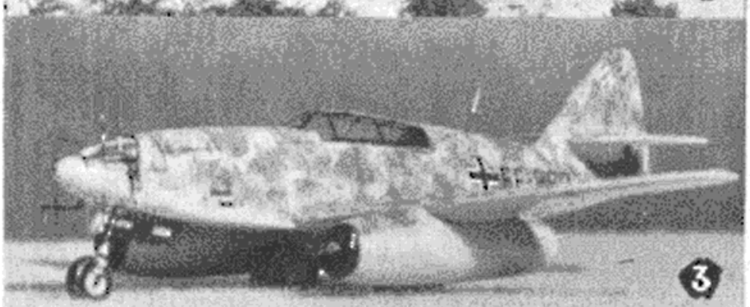


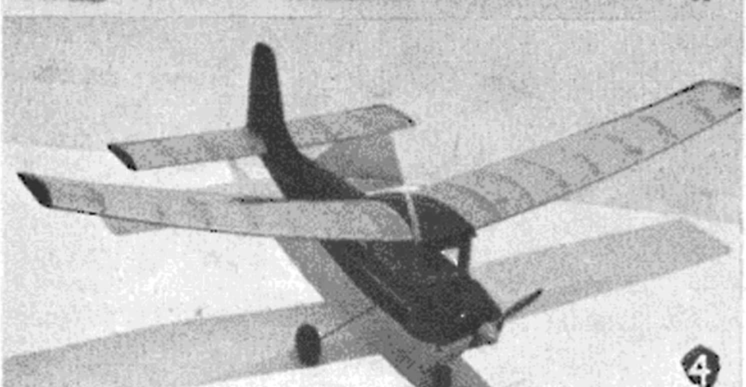
A well-built 5 c.c. class engine from Japan, the Enya 29 glowplug model. The needle-valve stem is flexible.

The main bearing, crankshaft and piston assembly of the Enya 29 are of sturdy construction.

PHOTONEWS

PERHAPS this modelling business has its moments after all, at least, that was our impression when choosing our heading photo! Like a true modelling enthusiast, George Gray gave us the details of the aeroplane *first*, and then simply stated: "The other model is Shirley Lowe." Playing *les gallants*, we have reversed the procedure and referred to the lady first. And now for the other model's details. Span is 30 in. and the power comes from an Elfin 1.49, giving it a speed of a mile a minute with a $7\frac{3}{4} \times 6$ in. propeller. George says the model has survived two vertical dives when he gave full "up" when inverted.





Judging by the number of *Nervensages* built, and being built, the design looks all set for emulating the success of its German prototype. The example shown in photo **No. 2** was built by Pete Turner from "M.A." plan No. 200 and he powers his version with an Oliver Tiger. They must be tough boys up in Heanor, flying in that weather!

The rakish lines of the Messerschmitt Me 262 A2 are shown to advantage by the 1/48th scale model seen in photo **No. 3**. The mottled camouflage is olive green and medium grey, and gives a pleasing effect to the model. Its builder, London modeller H. E. Wilson, has already had 15 models accepted by the Imperial War Museum for exhibition, and he hopes this latest effort will also make an appearance there. Man behind the camera for this shot was J. Seager.

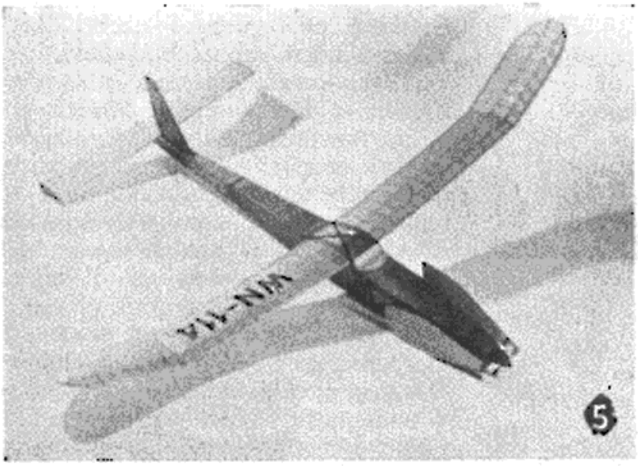
Debutante is the name of the Kalper 0.32 c.c. diesel driven model in our fourth photograph. Built by J. R. Campbell of Barkham, Wokingham, the model is now entering its third season of flying. Colouring is dark blue and yellow.

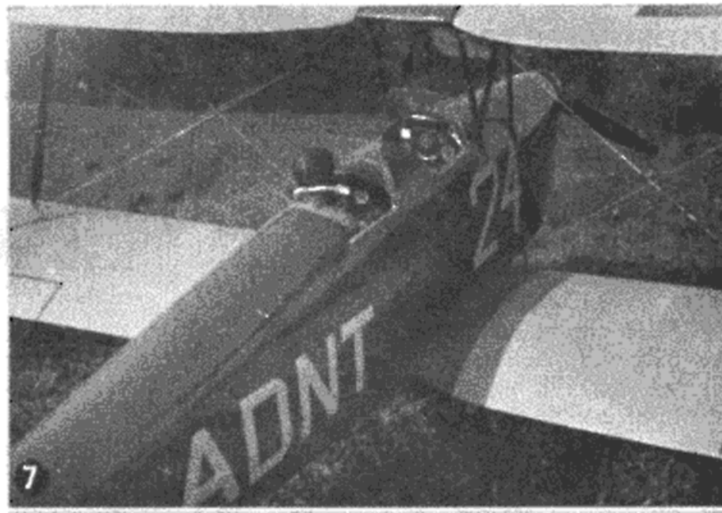
Polish modeller W. Niestoj sent us photo **No. 5**, which shows his Wakefield model that put him in top place in the Wakefield section at the Soviet States International Meeting held at Moscow last August.

Weather conditions were decidedly unfavourable and, of course, this was reflected in the times put up. Nevertheless his model clocked a total of 873 sec. to win by a considerable margin.

Due to the fact that the flying field becomes waterlogged during the winter, D. Hunter can only fly his model glider—photo **No. 6**—in the summer months. The model has 10 ft. 4 in. span and 12 in. wing chord. It weighs 3 lb. 5 oz. in flying trim. The photo was taken by C. Harrison in December 1953, but D. Hunter informs us that the glider is still going strong although it is now being re-covered.

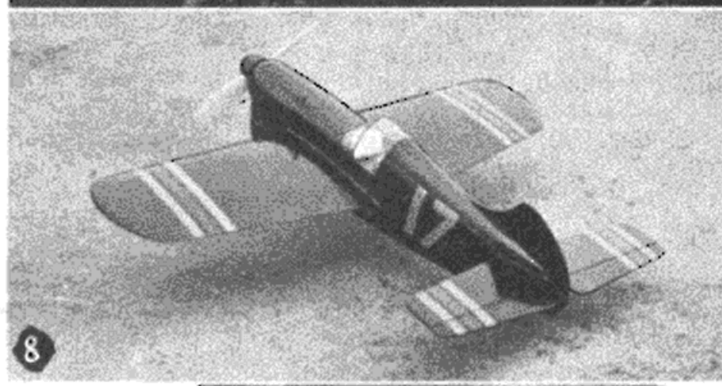
The old *Tiger Moth* has endeared itself to pilots and modellers alike, and few aircraft offer a more





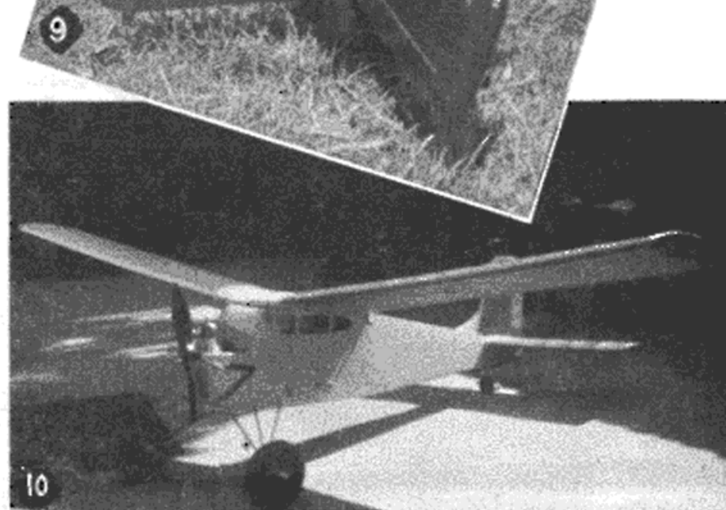
interesting task for the flying scale man. The nicely detailed "Tiggie" in photo **No. 7** was built by Frank Buckland of Sevenoaks and is powered by a Frog 500. It is to ⅛ scale and, rather surprisingly, is a control-liner.

Photo **No. 8** taken by Cpl. Bridgman, shows Cpl. Woods' *Presto* which is powered by a Frog 500 giving an average speed of 75 m.p.h. The finish is all black with yellow and red trimmings.



The C/L Convair XFY-1 model in photo **No. 9** was built by L. E. Kemp of Sutton, Surrey. Although flight trials have yet to take place, the builder informs us that from engine tests, the engine develops 0.2 b.h.p. at 6,500 r.p.m. on a 9 × 6 in. prop, which develops 2 lb. static thrust. The span of the model is 18 in.; weight, just over 1 lb., and it is powered by a Cameron 19 engine.

P. H. Wallis sent in our last photograph of this R/C model built to his own design. The specifications are: span 54 in.; 9 in. chord; power, Webra 2.49 Winner; radio E.C.C. 95 lb. receiver and an E.D. Mk. III actuator. The model was first powered by an Allbon Javelin, but proved to have insufficient power. It has now been turned to a flying test-bed for radio. The all-up weight is 2¼ lb. Mr. Wallis is a member of the Northwich Park M.A.C.



COVERING MATERIALS

THIN papers have been the chief covering material for model aircraft for the past quarter of a century. Before the war when large power models were the exception—and those that were built were generally silk covered—the "universal" paper for good work was Japanese tissue all of which had to be imported from Japan. Neither this country or America produced tissues which were really suited as covering materials until the 1940s and the position is now that "home made" tissues are more favoured than Jap and give comparable, and in some cases better, performance.

During the war, almost any tissue paper which could be found was used for covering. Most ordinary tissues lack the qualities required by a model aircraft covering material, being notably brittle, some suffering from excessive tautening after water-spraying, others being too porous, etc. The commercial tissues of this type still in use (e.g. in some kits) are of the best available within this category, still inclined to be brittle compared with special model covering tissues, but rather cheaper. Before these special model tissues appeared they would have been considered "good," but the post-war model tissues have almost completely superseded the traditional Jap tissue.

Jap tissue was formerly available in at least three grades (thicknesses) of white, and in a range of colours. Coloured Jap always appears more brittle than white and none of the colours is "fast." That is, they fade in sunlight. But Jap tissue, occasionally available in small quantities, still warrants consideration as a covering material for contest models of small to medium size, especially rubber types.

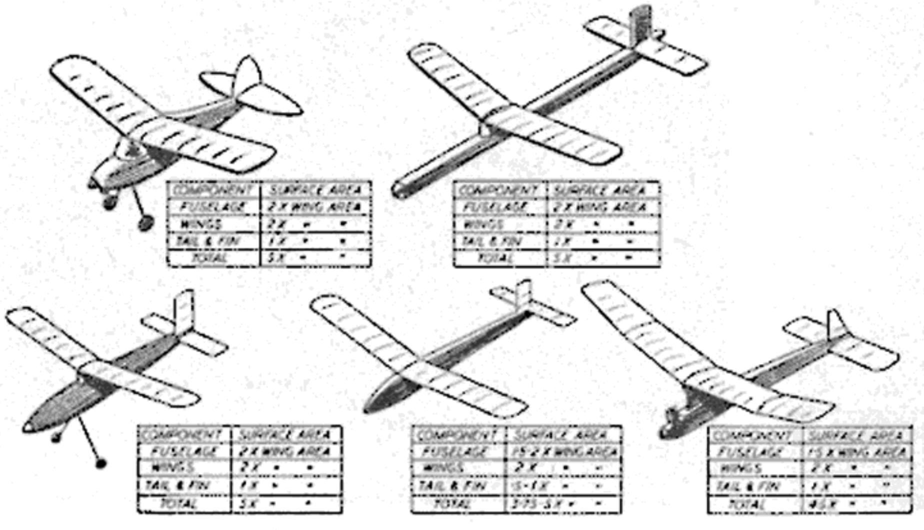
The post-war British covering is Modelspan, a proprietary tissue, in which the fibres are arranged in the form of a more or less random grain with a relatively open structure. Of the two grades available, lightweight Modelspan is lighter than Jap before doping. Being more porous, however, it soaks up a greater weight of dope and needs more coats to seal it effectively. After a single coat, or even two coats, close examination will show definite pin-holes in the surface where the pores are not yet filled. Doped lightweight Modelspan appears to be at least as strong as Jap with less tendency to split on impact. It is also easier to apply, both as regards sticking down to the framework and its shrinkage properties after water-spraying. Heavyweight Modelspan is a much thicker covering material with improved strength qualities, but is otherwise similar.

Broadly speaking, lightweight Modelspan meets all the requirements for a covering tissue, i.e. covering all types of rubber and glider models up to Wakefield size and the smallest types of power models. Heavyweight Modelspan is the covering material for larger models or well handled parts, such as Wakefield fuselages.

One of the most remarkable developments in model tissues has been the production of "water-resistant" tissues. The first of these, known as Silkspan, was produced in America by the Aldine Paper Company. The British equivalent is Modelspan "Wet-Strengthened" tissue, whilst another American product, Skysail (by the Whitefield Paper Company) comes into the same category. All three are different and distinct in their properties.

All papers are made from a pulp which consists essentially of a mixture of base fibres with a lot of water. This pulp is laid on fine mesh wire screens where the water drains off leaving the collection of fibres behind. The wet fibres are lifted off the screen and subjected to processing through various felts and driers finally to emerge as a finished sheet. Binders are used to hold the fibres together and it is on the type of binder employed that much of the strength of the paper depends. For instance, if binders are omitted altogether a very weak, porous structure results—e.g. blotting paper.

Now the common paper binders are soluble in water. Hence if the paper is dampened the fibres are quickly freed and readily displaced. This is a desirable feature for model aircraft covering since on drying again the fibres first contract, pulling



PLAIN & DOPED COVERING
APPROXIMATE WEIGHTS

Covering	Approx. weight, oz./100 sq. in.				
	un-doped	1 coat	2 coats	3 coats	4 coats
White tissue	.0535	.0585	.063	.068	.0725
Jap. tissue	.028	.032	.035	.038	.041
Modelspan Lightweight	.026	.046	.061	.075	.090
Modelspan Wet strength	.027	.052	.067	.082	.097
Modelspan Heavyweight	.055	.075	.095	.115	.135
Silk	.05	.065	.080	.095	.110
	.15	.165	.180	.195	.210
Nylon	.15	.165	.17	—	—
	.20	.215	—	—	—

N.B. Used with the diagrams, these data can give estimated covering weights for various components or complete models.

the tissue covering up taut, if fastened down around the edges. On the other hand, in the damp state the tissue is very weak and easily damaged since there is very little holding the fibres together.

It is possible to use other types of binders which are resistant to water. If a sheet of such tissue is soaked in water it may be almost completely waterproof or exhibit water resistance in varying degrees. If highly water resistant it will not expand first and then shrink tight on drying. Also it will retain a high proportion of its normal strength even when thoroughly wet and can be handled in this state without particular care.

All three of the water-resistant tissues mentioned exhibit this property, which means that they can be applied in a damp state. White Silkspan and wet-strengthened Modelspan can even be treated like a fabric and immersed in a dye bath to colour, then wrung out and dried. Silkspan and Skysail are water-resistant to the extent that water-spraying has virtually no tautening effect and the necessary tightness is taken up by doping. Modelspan has a more open structure and does respond more to water-spraying, but doping again produces the final tightness.

The advantage of using a tissue instead of a fabric covering material is that paper is so much easier to apply. Suitable covering fabrics are lightweight silk (Jap silk) and nylon.

Both lightweight silk and nylon are available in various thicknesses. Most grades are still heavier than "strong" tissues, particularly after doping. Also nylon covering tends to be heavier than silk. Both, however, are stronger than tissue.

Weight is therefore usually the deciding factor—or cost. Where weight is not so important, as on large power model wings and fuselages, etc., silk or nylon covering is logically a first choice. Either will give a stronger covering, more resistant to tears, etc., and more durable. Nylon is generally superior to silk, the heavier parachute grade being almost ideal in this respect. However, its weight normally restricts its application to fuselages.

Both silk and nylon are best applied in a thoroughly damp state, using a dextrin type adhesive. Used over sheet covering it pays to prepare the surface by filling the grain with a sanding sealer and sanding smooth, to minimise adhesive absorption and prevent it drying out too quickly. Both these covering materials have no tautening tendencies when wetted and so must be pulled in place perfectly taut. Full strength glider dope must then be used to achieve final tautness, at least for the first two coats. If ordinary model dope is used, then usually the covering slackens off when dry and is difficult, or even impossible, to pull up tight again by further doping. In such cases the best treatment is usually to wet the slack covering thoroughly with thinners and then apply a coat of full strength dope at once.

SELECTING YOUR COVERING MATERIAL

Bamboo paper—true bamboo paper is a Chinese product, made from the interior portions of stems of bamboos. Imported pre-war, tissues of this type found their way into the model trade. Bamboo tissue is tough, rather heavy and inclined to brittleness on ageing. It was used for covering power models. It is not obtainable in this country.

Rice paper—A Japanese paper, *not* made from rice but from the pulp of a small tree which grows in Formosa. Produced in white and colours, it is a tough, smooth "power" model covering, little used nowadays.

Rag tissue—An extremely light, porous tissue with little strength, used as a substitute covering material when better tissues were unobtainable. Not recommended.

Condenser tissue—Dense white tissue, thin and light, but rather brittle. Another wartime "substitute," now little used. A number of other tissues of this type were sometimes called "English" tissue, characterised by high shrinkage and extreme brittleness.

Jap tissue—The original lightweight model covering material, made in Japan from the pulp of native fibres of the Mulberry family. An excellent covering for small models, may sometimes be obtained coloured. Before the war, was also produced in different thicknesses. Except for special jobs, now largely replaced by the post-war "model" tissues.

Silkspan—The first of the true "model" tissues and of American origin. Produced in several grades and characterised by its property to retain its strength when wet. A tendency to brittleness when doped and also a little on the heavy side. Not available in this country.

Modelspan—The British post-war model tissue, produced in both lightweight and heavyweight grades in a complete range of colours. The latest version is "Wet-strengthened" Modelspan, which retains similar properties, and is far easier to handle when wet. An open grain tissue which takes several coats of dope to seal, but with excellent strength and working properties.

Skysail—An American product in two grades, light and heavy, and a variety of colours. Tough, durable, easy to work but a little on the heavy side. Tautens only a little with water but pulls up with dope. Not available in this country.

Oiled silk — The covering material for single surfaced aerofoils in the birch and spruce days—is attached to the frame with ordinary glue! Tough, impervious and with a certain amount of flexibility. Needed no doping. Not used on present-day models.

Silk—An excellent covering material for larger models where better covering strength is required and the extra weight is not so important. Available in various grades. Gets brittle on ageing, or with excessive doping. Must be applied damp and full strength dope used.

Nylon—For maximum strength. Not so easy to work, but a very durable covering. Ex government stores are a source of this material in at least two grades. Generally superior to silk for strength on open frames, e.g. wings, etc. Application is similar to silk.

DOPE ABSORPTION: AVAILABLE COVERING TISSUES
(Approx. Values with 50 : 50 Model Dope)

Tissue	Approx. Weight Increase—oz. per 100 sq. in.	
	First Coat	Each Extra Coat
Standard White	.005	.005
Japanese	.004	.0035
Modelspan Lightweight	.020	.015
Modelspan Lightweight (Wet strength)	.025	015
Modelspan Heavyweight	.020	.020

Letters

Continued from page 211

will find, as I have done, that with a little practice almost any shape can be covered with great effect. Rivet lines are best marked out with an old watch or clock gear wheel, the size of the wheel and teeth being chosen to suit the model. The wheel should be mounted on a handle so that it can rotate, then it is just wheeled over the model against a ruler to mark out the rivet lines. Ailerons and other control surfaces can be very well marked out with an old Biro ball point pen, this makes a line without tearing the surface of the metal. The finished aeroplane can be polished with Duro-glit (impregnated wool metal polish) and clear lacquered to retain polish and prevent scratching.

Hoping readers will find this of interest.

Yours faithfully,

Horley, Surrey. PETER DONAVOUR-HICKIE.

DEAR SIR,—Mr. Walter, in his letter in the April issue of MODEL AIRCRAFT, raises some interesting points *re* covering with silver backed paper as applied to solids. It occurs to me that readers may like to read details of how I used this excellent material on a 64-in. wingspan C/L model of a de Havilland *Heron*.

After covering all wood surfaces with tissue and sanding smooth, I applied the paper using thick clear dope as the adhesive. Results were most encouraging.

I can thoroughly recommend this covering medium to any scale modeller who seeks real authenticity. I found it a simple process, butt joining on large models is *not* essential provided lap joints follow the general line of rivets. I had no difficulty in applying quite big panels; actually the only limiting factor was the double curvature of certain parts, demanding care and accurate cutting—I used large scissors by the way. Rivets were child's play to duplicate, tools needed—a straight-edge and an old clock cog wheel, with suitably spaced teeth, mounted in a wooden handle! At a rough estimation I should say there are nearly 4,000 rivet marks on my *Heron* . . . try that with a sharply pointed pencil! Using this simple technique I won a first prize, diploma for best individual exhibit, and public vote as "Champion of the Show," at our local Arts and Crafts Exhibition held recently, and I make no claims as a *concours* builder . . . like Mr. Fearnley's, my models are built to fly. Incidentally, my congratulations to "E.A.F." on his articles—at last a modeller after my own heart.

Yours faithfully,

Sevenoaks, Kent. F. H. BUCKLAND.

Scale v. Functional

DEAR SIR,—I would like to make a few criticisms on Eric Fearnley's article in your April issue. The article was headed "More Flying Scale Topics"; it seems rather an inappropriate title, as half of it was devoted to running down the contest modeller.

He complains that the S.M.A.E. spends too much money on contests—he would not complain so much if he read the small type on the front of his S.M.A.E. membership card. It states that the S.M.A.E. is recognised by the F.A.I. as the Sporting Authority for Model Aeronautics in Great Britain.

Mr. Fearnley infers that there is a lack of workmanship and skill in contest models, perhaps if he took a look at the models built by such topliners as Mike Gasten and Pete Buskel he would be forced to admit that few scale models are as well built.

If Mr. Fearnley took a good look at his model mag's he would see that there is more space devoted to sport and scale than to contest models

The ultimate aim of aeromodelling, according to Mr. Fearnley, seems to be to amuse the general public. So much for his "fly for fun" attitude. Surely it is keenness that counts; I don't think I've ever heard of "sport" modellers travelling 250 miles to a flying meeting. Surely a chap who does that deserves all the support he gets. The sooner Mr. Fearnley gets the idea out of his head that contest fliers are only after pots, the wiser he will be.

I like to see a flying scale model and wouldn't like to see them disappear. If we had more of the "live and let live" attitude, the model world would be a lot better off.

Yours faithfully,

R.A.F. Hednesford. C. F. PETERS.

DEAR SIR,—I hope you will publish more articles by Eric Fearnley as I, and no doubt thousands of others, have been waiting for someone to champion the scale modeller.

Yours faithfully,

Hucknall, Notts. P. BUCK.

Potting at Pylonius

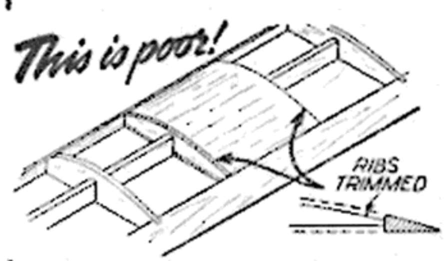
DEAR SIR,—Your May "Topical Twists" surprised me, at least the item "Uncharted Climes" did, which I read on a non-stop express train between Southport and Manchester. Rather surprisingly, the journey took 50 minutes—to cover "15 damp miles." Come, come "Pylonius," not even British Railways are as slow as that!

As Blackpool is also on the same "wet and windy coastline" as Southport, perhaps this year I will be able to walk along both beaches in solitude, shivering, and remember the days when holiday makers in their thousands used to sun themselves to a turn.

Yours faithfully,

Southport. "SANDGROUNDER."

DESIGN IN TIPS No. 5



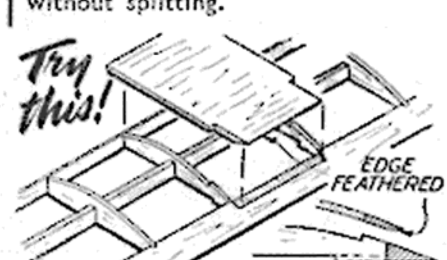
The centre sections of many wings and tailplanes are sheet covered. Except on the smaller models, $\frac{1}{16}$ in. sheet is about the thinnest size which can be used, otherwise there is a danger of the covering being crushed with rubber bands, etc. But this frequently means that when ribs are trimmed down to take the sheet flush with the aerofoil surface, the depth of rib remaining attached to the trailing edge is fractional. Such a joint is obviously very weak and relies on good fixing of the sheet to restore normal strength. If the sheet is not properly cemented to the trailing edge, then this member will easily twist and break away.

The lower sketch shows a better way of fitting centre section sheet covering. It is a little more difficult to do, but makes for a good, strong assembly.

Instead of trimming down the whole depth of the rib, leave it full depth near the trailing edge and cut "steps," as shown. The top of the trailing edge between the centre ribs is then chamfered off flat.

Trim the rear part of the sheet covering so that it will just fit between the ribs and taper off the sheet to a feather edge. It will be seen that the sheet then locks itself in place and also fits down flush without relying so much on the cement to make a good joint. A final sanding fairs in the sheet flush with the trailing edge. The bottom sheet covering is treated in a similar way, this time locating the step rather more forward.

Another advantage of this method is that it can be used when the centre ribs are slotted into the trailing edge. You must remember, however, to make and fit the rear portion of the sheet covering first. If the sheet you have available is not wide enough to cover in one piece. Grain *must* run spanwise and choose the type of wood which bends fairly readily without splitting.

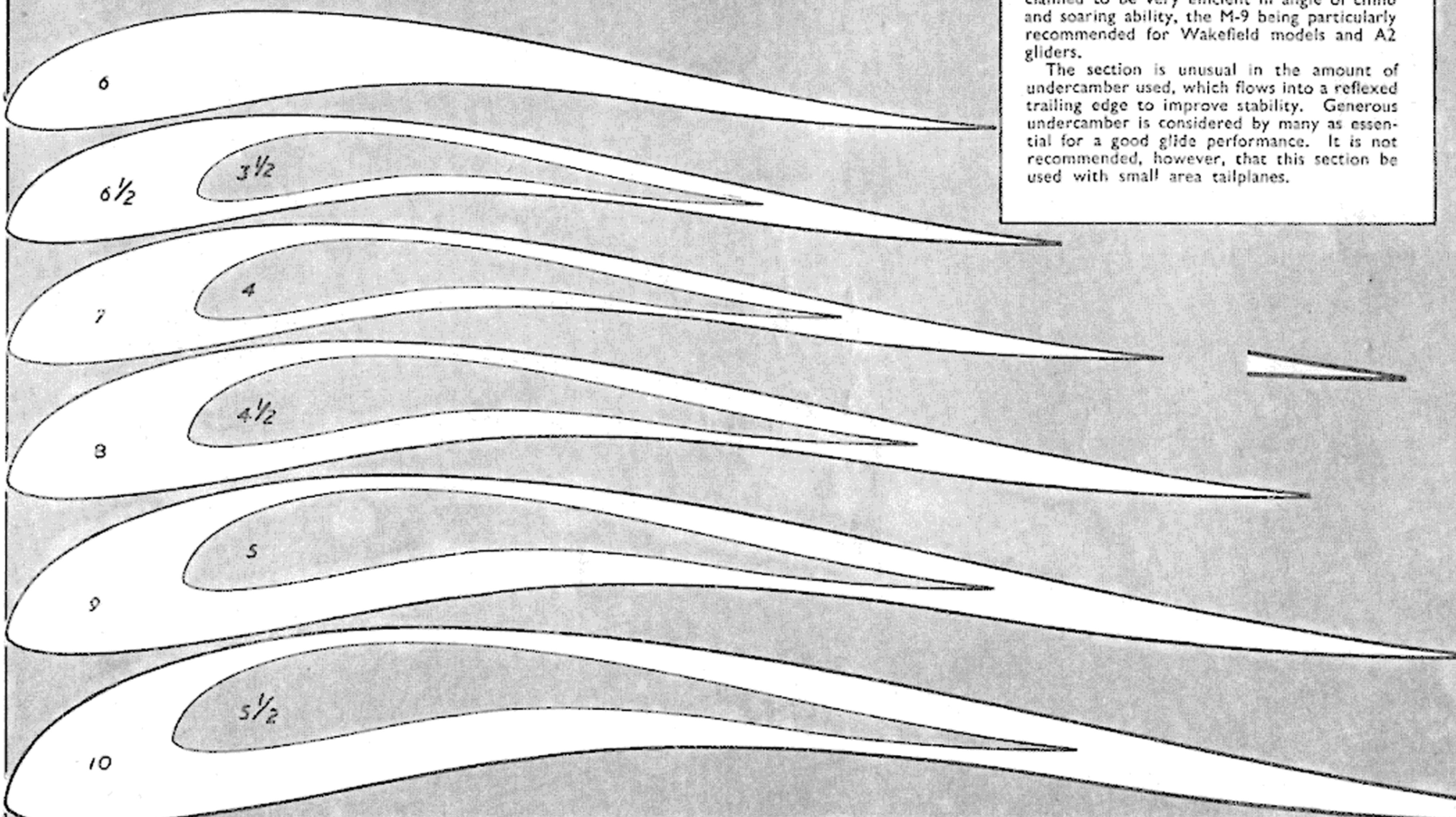


GRANT M-9

STATION	0	2·5	5	10	20	30	40	50	60	70	80	90	100
UPPER	0·0	4·5	6·4	8·85	10·8	11·1	10·3	8·8	6·95	4·84	2·94	1·22	0·0
LOWER	0·0	-1·14	-1·22	-·8	1·15	2·62	3·91	3·46	2·78	1·72	·73	0·0	0·0

The M-9 is one of a series of bird-type sections evolved by Charles Hampson Grant, the noted American model writer. They are claimed to be very efficient in angle of climb and soaring ability, the M-9 being particularly recommended for Wakefield models and A2 gliders.

The section is unusual in the amount of undercamber used, which flows into a reflexed trailing edge to improve stability. Generous undercamber is considered by many as essential for a good glide performance. It is not recommended, however, that this section be used with small area tailplanes.



Club News

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

WEST OF SCOTLAND AREA

The area had only one entry in the Gamage and about five in the Pilcher, due to "circumstances beyond our control," another name for the weather. The Lanark club were the glider goons and Prestwick supplied the rubber fan. Conditions at Prestwick were utterly fantastic, a model going o.o.s.s. (out of sight in snow). It was recovered, much battered, the day after. We were considering a protest about the unfair allocation of weather, since according to the radio, London Area had bright sunshine !

However, the sun came out at Heathfield for the S.M.A.E. Cup and Farrow Shield and also the 1st of the U.K. eliminators, which are being run in conjunction with S.M.A.E. contests this year.

B. Harris of Prestwick was first in the area in the S.M.A.E. Cup, R. Parsons of Prestwick first in the special power eliminator and H. Cliff of Prestwick first in the Farrow Shield. As can be seen it was a field day for Prestwick, this being due to the fact that they had their kites trimmed and the rest hadn't. It doesn't pay boys, especially against Prestwick !

The Lanark Club are flourishing again with some keen juniors in their midst. With a little more practice they'll provide some stiff opposition, so stick it, boys !

Glasgow M.A.C. also turned up with some promising fliers although the next time they compete, a timer on their power jobs wouldn't come amiss. Pun ?

SOUTH MIDLAND AREA

Sunday, April 3rd saw quite a good turn-out for the S.M.A.E. Cup 2nd A/2 glider eliminator at Henlow, Beds. The weather was dull and wet until early afternoon with a moderate wind, but as the weather brightened up so the wind strength increased, and towing was made very difficult, especially for the inexperienced, although several regulars also came to grief.

There was only one maximum, this by J. Waldron (Henley) in the first round, and he led all the way to aggregate 10 : 14. He was followed by clubmates Tony and Roy Cooke, who finished with 9 : 26 and 7 : 29 respectively, J. Lamble (West Herts.) was fourth with 7 : 19.

On the aggregate results there will be nine members in the Finals: J. Waldron (Henley) 18 : 36; A. W. M. Cooke (Henley) 17 : 35; C. Ward (Beavers) 16 : 41; R. E. Cooke (Henley) 16 : 02; P. Larcey (Jnr.) (Henley) 15 : 52; J. Lamble (West Herts.) 13 : 43; R. Clements (Luton) 13 : 34; Mrs. B. Moulton (West Herts.) 13 : 20; A. Longstaffe (Beavers) 11 : 31.

There were no entrants for the Farrow shield and only two for the Jetex, and it seems that it would be better to hold these events later in the year, probably about July, when the eliminators and trials are over.

MINCHENDEN M.A.C.

Now the flying season is beginning, one can see numerous jobs on the school field where we fly. The main interest lies in team racing, and at least two members are knocking models into flying shape. R. Nichols had two class "A" racers before the beginning of the flying. He is now starting to re-build them. Full marks go to his most spectacular prang when, after doing 11 laps his 2.46 suddenly went in reverse and the model descended rapidly, bits flying in all directions. The other bod, B. Bagot is doing quite well with two re-worked 2.46's in a couple of racers. He recently pranged his *Sid McGoon* after doing 82 m.p.h. on a plastic prop. claiming that he had tested the design to destruction. He said the wing was too thin for a good glide and the elevator had far too much flutter.

HUDDERSFIELD DISTRICT M.A.C.

The latest news is that the two postal contests with the Hastings club of New Zealand has now taken place and our results are being sent by airmail to the Hastings club.

H.D.M.A.C. results: A/2 glider, L. Hirst 11 : 15; A. Bradley 9 : 54; R. Kerr 5 : 58; D. Dickinson 5 : 54. F.A.I. power, L. Hirst 10 : 58; R. Kerr 7 : 17. Other power fliers included D. Dickinson, A. Bradley, F. Gardner and E. Bolton, but their models did not make the necessary five flights. We shall now have to wait until we hear how our New Zealand "rivals" have faired.

ASHTON M.A.C.

The club stated-time competition was held in perfect weather. Five flights were made—min. flight time 60 secs. Some of the boys who caught unwanted thermals (what a change!) were duly penalised and the eventual winner was C. Girling.

If any clubs within fifty miles of Manchester decide to run open comps. would they please inform us, as last year we missed some through lack of knowledge.

BRIDPORT & DISTRICT A.C.

The club, which has been in existence some four months, meets each month in the local A.T.C. headquarters, and flying meetings are held each Sunday at the local grammar school's sports field, by kind permission of the headmaster. This is a large, flat, hilltop area, which is admirably suited to all types of models, club membership now stands at thirty one.

Most members are interested mainly in C/L (speed and team-racers) and sailplanes. The juniors are, at the moment, mainly concerned with Jetex. We have held two contests so far, several having been postponed because of bad weather. The open speed contest was won by J. Morey with an Elfin 1.49 powered model at 73 m.p.h. The open glider contest was won by I. Godfrey, whose aggregate includes the present record of 7 min. 49 sec. o.o.s. (the model was a *Mercury Martin*). These contests are run on a points basis, the points being added up at the end of the year. There are also small prizes.

We have been given two cups, both of which have yet to be competed for. One is for C/L speed and the other is for C/L scale and semi-scale. The first is to be competed for quarterly, the second each six months.

Four members, including Mr. Frank Trevett the club president, have reached the R/C stage. Aren't we envious !

PETERBOROUGH M.A.C.

The club is favourably blessed with a warm room for winter club nights, but outdoor summer-evening flying is being looked forward to with relief after the hair-raising flying by club member Hutchcraft with his R.T.P. rubber delta speed job, which has won him a pot. Old and new members are invited to come any Tuesday at 7.30 p.m. to the City Youth Centre, where the club meets. In the outdoor sphere, a free-flight comp. was recently held over two days, only rule being that models must remain within club field, which being rather small led to short times. "Flying" visitsto nationals, etc., are anticipated.

HEANOR & DISTRICT M.A.C.

The boys are busy preparing for the coming contest season, as the club is going to try to attend nearly all the major meetings in force.

The team race boys are busy running in their Olivers. There are already six Oliver powered team racers in the club, and one more engine is

ROUND the RALLIES

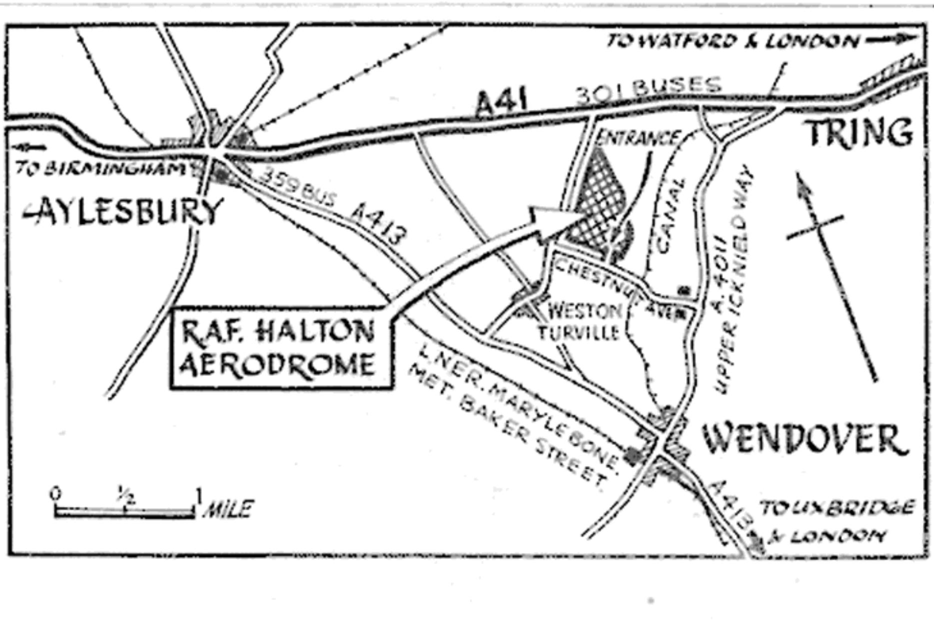
NORTHERN HEIGHTS GALA DAY

R.A.F. Halton June 26th.

The rules for the combat event for the Keil Combat Cup are:—Engines up to 5 c.c.; line length 52 ft. 6 in.; streamer length 10 ft., attached to 3 ft. thread; Le Mans start; 2 models per heat; 1 pilot, 2 mechanics per aircraft; 5 minute rounds; undercarriage optional.

The R.A.F. M.A.A. Cup for boy entries and apprentices will be run in conjunction with the rally.

A shuttle service will be run by the United County buses between Kingsbury Sq., Aylesbury and the aerodrome gates. Metropolitan trains from Baker Street, to Aylesbury, B.R. trains from Marylebone to Aylesbury, Green line buses 707 and 706 from London to Aylesbury. 301 buses from Watford via Tring to Aylesbury, 359 buses from Amersham via Wendover to Aylesbury. Cars, A41 and A401 (Ickneld Way) and Chestnut Avenue.



due any day now. Also we have five Eta 29's in the class "B" side, ready to fly them to victory ?

One of the latter, a *Sorcerer* built by K. Plumb, recently won first prize in the model aircraft section at a handicraft exhibition sponsored by a local Co-op Society. Jim Bates' Mercury *Grebe* came second and Lou Whitworth's scale *Sea Fury* came third.

Besides team racing most of the club are building free-flight models for future contests. The most popular is the *Last Straw* A/2 glider. We have one seasoned radio flier, M. Hargreaves, whilst K. Plumb and K. Cresswell are just starting in this branch.

As well as contest flying, we have a busy display programme to fulfil, so we hope to have no dull moments this year. The boys are in public demand as they are said to liven up any show they appear in and how they love it ! We find that a team race, followed by a multi-engine scale model flight rounded off by a combat event goes down well with the crowd. Especially when two combat models get locked together in flight. As if we would do it on purpose !

BRADFORD AND LEEDS M.A.C.

We had good conditions at Baildon for "Damage Day," and some high times were recorded; C. P. Miller and K. Rutter scored 10 : 54 and 9 : 28 respectively in the Gamage, whilst in the Pilcher, Stan Eckersley, Bradford secretary, put up the day's highest time with 10 : 21. Best from Leeds was 7 : 21 by junior Dennis Neil.

The Farrow Shield was an all-Leeds affair, as Bradford can no longer field a rubber team; but despite six entries the best times were 9 : 48 by Ken Rutter and 8 : 50 by Henry Tubbs. Bradford, however, took top club honours in the S.M.A.E. Cup with 10 : 26 by S. Eckersley, but Frank McNulty of Leeds deserves equal credit for his marathon performance, as he clocked 9 : 18 in this event and also placed 3rd in the open power contest held the same day with 9 : 19, flying an E.D. 2.46-powered *Creep*. Silvio was for once dislodged from his usual place at the head of the power entry list; *Creep* designer Brian Eggleston beat him by almost 2 min. with an Oliver Tiger version and won with 11 : 24. (The maestro got his own back in the club power comp. on April 10th, finishing 1st in appalling weather with a 5 : 00 aggregate. 2nd place went—believe it or not—to Henry Tubbs, with 4 : 30 from an antique 1.5 c.c. F.A.I. job !) Winner of the club Wakefield was K. Rutter with 5 : 19.

Leeds held their annual prizegiving and social recently, and several Bradford members attended this function, which was very enjoyable.

AEROBODS OF NOTE

CPL. EDWARDS, R.A.F.

Familiar figure at model flying meetings. A noted member of the R.A.F. Model Aircraft Association. Interested in the unfamiliar and experimental types of flying scale models.

THE BRISTOL & WEST M.A.C.

The last of the winter season's indoor meetings featured a novelty event. Competitors had to build a glider from a half sheet of 1/32 sheet. Many and varied were the results, and performances were creditable. Richard Farr was finally declared the winner.

The first outdoor meeting held on the Durdam Downs, was a chuck glider event, which was won by G. Woolls, with a best flight of 32 sec.

A search for a local flying ground where all classes of models may be flown, is taking place. Such a ground, provided it is easily accessible, should considerably improve the active strength of the club.

At the Southern Area meeting at R.A.F. Aerodrome, Old Sarum, in poor weather, Manderville Jnr. assists Manderville Snr. (Bournemouth M.A.S.) to fly in the S.M.A.E. Cup.

MEN OF KENT AEROMODELLERS

Recently the club got together to fly in the Pilcher and Gamage Cup; times were not very high, due mainly to a very restricted flying ground, and casualties were heavy, but on the whole we enjoyed ourselves.

We have recently been recruited to give a series of lectures on aeromodelling to local youth clubs, and it is thus hoped to increase public interest in our activities.

WEST HANTS. A.A.

At the southern area meeting on April 3rd, at the R.A.F. Station, Old Sarum, Nr. Salisbury, in spite of the appalling weather conditions, Sid Taylor scored the highest time of the day with a total of 7.08 min. in the team rubber event, but unfortunately did not get sufficient support from the rest of the team to back him up. Two of its members had the bad luck to crack up their models on their first flights whilst Bob Wheatley found on arrival at the field that the tailplane of his model still reposed on the table at home !—still, secretaries are such harassed people aren't they, so perhaps we can forgive him !

The inter-club contest between Bournemouth M.A.S. and West Hants. A.A. is again scheduled to take place this year, covering three rounds as before, one each for rubber, glider and power. The first round for open gliders is due to be held on May 21st. After the close and exciting contest last year when Bournemouth pipped us to the post, this year's comp. should put both clubs even more on their mettle.

WALLASEY M.A.C.

We recently had some measure of success in the A2 elims. on April 3rd, under conditions of near gale force winds. John Hannay was top in N.W. area with flights totalling 12 : 02—this means a total of 19 : 43 for *both* 1955 elims. and placing 3rd in Area. Stan Hinds was 3rd in the area with 10 : 59—giving a total of 22 : 31 for both elims. and placing 2nd in area. Also in 2nd elims. Pete Nicholson did 7 : 08 and Bob Hotchkiss 6 : 44.

The power boys are busy making final test in preparation for their elims.—though "Len" Hutton lost his Javelin powered model recently.

We extend a welcome to our first lady member, Ray Sutton's wife !—this must be the start (or end !) of a new era of club history; after the eleven peaceful years !

FORESTERS (Nottingham) M.F.C.

The Foresters have successfully started the 1955 contest season; Tom Woodward, flying his own-design A/2, reeled off three maximums and an 8 min. fly-off to win the Pilcher by a handsome margin. Ken Oliver flying a similar model placed seventh. Ken also placed sixth in the Gamage Cup. At the second A/2 eliminator, Tom and Ken placed second and third in the area, to bring their final position to first and third respectively for the trials.

The team-race circus was shaken out of hibernation on Easter Sunday when it was realised that there was a race on the next day. So dragging the 1954 models out of moth-balls, where they had lain for six months, the crews departed for Congleton where wins were duly notched in both class "A" and "B." "Puddy" Puddephatt amazed the boys with his monstrous *Barn Door* with a K.B. 29 up front. Puddy's streamer was in more danger from his own fantastically tight manoeuvres that it was from the opposition, but burning plugs and obstinate fuel-tubing put him out of the running.

BELFAIRS M.A.C.

In very poor conditions on April 3rd, club members did quite well. Second in the area for the S.M.A.E. Cup was Pat King flying an *Inch Worm* (8 : 23) which also topped the women's results (4 : 41). The Farrow team (Michael Cundy, Martyn Pressnell, Dave Willmott and Mrs. King) were all flying lightweight rubber jobs and totalled 21 : 14. The Jetex Cup saw Pressnell flying a 50 job that astounded all with remarkable stability in the high wind—he massed a ratio of 21 : 51.

A much enjoyed all-in scramble on Easter Sunday was won by Cundy with just the right number of turns on a lightweight rubber model. 2nd was Mick King with a *Dab* glider that insisted on flying away in the middle of the proceedings and third was Pressnell with another lightweight rubber job. These affairs are definitely to be encouraged as anything can be flown and it does a lot to foster enthusiasm.

HYDE M.A.C.

Hyde Club are now coming out of hibernation and are preparing for the good weather ahead. R/C dominates the scene with boats and planes.

R. Wilson, B. Ayres and John Howard are preparing for a go at the R/C records. It is hoped this year that the club show results at Woodford Rally and Sherburn Show. We may hold our rally this year (last year's rally was cancelled owing to bad weather).

Prizes are cash £5 (1); £3 (2); £2 (3); £1 (4) in seven events. Once again we offer our 450 acres of fields for use in a good isolated spot—no trees—no buildings. Or are modellers too lazy to travel ?

WARE & D.M.A.C.

At the A.G.M. great changes were made in the committee with only one of the previous committee members being elected to his old post.

It was suggested at this meeting that seniors who were still at school should pay junior subs., and at the next monthly meeting this was very surprisingly carried by a large majority (an example to other clubs ?).

Apart from the " comp a month " system the club has three comps for this season; these are an open glider with some ultra modern designs coming forth, a scale power and a Jetex free-flight competition.

Several members went to the A/2 eliminators at Debden, but no good times were put up; the excuse being (there always is one) a very high wind !

During the winter quite a few other interests have crept into the club including motor cycles, model boats, radio and photography, but a little modelling has been done by the few aero-modellers in the club.

At the beginning of April the club lost its original hon. sec. E. Barks when he resigned from the club due to pressure of work.

CAMBRIDGE M.A.C.

Recent drains on senior membership through National Service and marriage have resulted in the club committee cancelling the 1955 Cambridge Team Racing Rally.

It is hoped that the acute lack of senior organisers will be overcome in time to allow the 1956 event to go ahead as planned when the series of rallies was launched a few years ago.

CROYDON & D.M.A.C.

The boys have been caught up in the social whirl lately, the London area stag party rapidly following the club dinner. The dinner was generally agreed to have been the best yet, due in no small part to the hard-working M.C., John Palmer who conducted the merry-makers through such items as a rubber motor breaking contest, a plastic balloon blowing race and a paper dart competition.

Coming back to business again, Ed. Bennett started the season on the right foot by winning the Gamage Cup with a time of 11 : 52 in most un-Gamagelike weather.

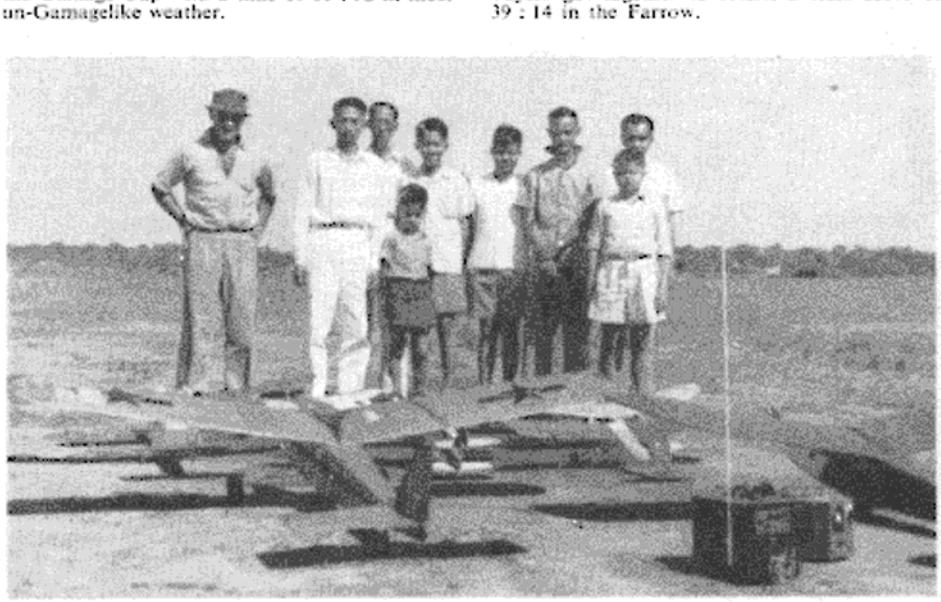
On Marathon Day (otherwise known as Farrow Shield—S.M.A.E. Cup Sunday), the boys were run off their feet trying to make eight flights in a day. Although the weather was what is politely known as inclement, Ed. Bennett, John Palmer, A. Williams and new recruit Paul Taylor got together to return a team score of 39 : 14 in the Farrow.

MODEL AIRCRAFT CONTEST CALENDAR

May 29th	R.A.F. Waterbeach BRITISH NATIONALS †**THURSTON CUP.** Glider. **DAVIES TROPHY.** Team Race " A." **SHORTCUP.** 2.5c.c. PAA-Load. **GOLD TROPHY.** C/L Stunt. **S.M.A.E. TROPHY.** R/C. **C/L SPEED.** All Classes.
.. 30th	†**SIR JOHN SHELLEY CUP.** Power. †**MODEL AIRCRAFT TROPHY.** Rubber. **DAVIES TROPHY.** Team "B" **BOWDEN TROPHY.** Precision Power. **SUPER SCALE TROPHY.** Scale Power. **TAPLIN TROPHY.** R/C. **LADY SHELLEY CUP.** Tailless. **C/L SPEED.** All Classes.
June 11/12th	**Intern. C/L Speed. Milan-Yugoslavia Cup.**
.. 19th	Centralised. **TRIALS.** R.A.F. Odiham Rubber/Glider/Power.
.. 26th	**Northern Heights Gala Day.** Halton Aerodrome, Bucks. **WORLD CHAMPS.** C/L Speed 2.5 c.c. Paris.
July 3rd	Decentralised. **KEIL TROPHY.** Power. **FROG JUNIOR CUP.** Rubber/Glider.
.. 10th	**Clwyd Slope Soaring Rally.** Clwyd Hills, North Wales. **All Kent Rally.** Dartford Heath.
.. 17th	**Enfield C/L Rally.** Enfield Playing Fields. **Europa Cup.** Saarbrucken.
.. 22/24th	**International Meeting.** Jami Jarvi, Finland. Rubber, A2 & Class D Power.
31st	**INT. R/C CONTEST.** To be held at Northern Gala.
July 31st & Aug. 1st	**NORTHERN GALA.** Centralised. ‡Croft Airport. **C.M.A. CUP.** Glider. **FROG SENIOR CUP.** Power. **FLIGHT CUP.** Rubber. **TEAM RACE.** F.A.I. 2.5 c.c. **TEAM RACE.** Class " B." **C/L SPEED.** All Classes. **PAA-Load.** 1 c.c.
Aug. 6th	**R.A.F. Championships,** Horsham St. Faith, Norfolk.
.. 15/16th	**Stella d'Italia Cup.** Trentino Italy. Gliders (slope soaring).
.. 14/21st	**Nat. Meeting with Int. Contests,** Yugoslavia.
Sept. 3/4th	**WORLD CHAMPS.** Wakefield, Power & A2 Gliders. U.S. 'drome in Germany.
.. 11th	**C. H. Roberts Cup.** Blackheath, London, S.E.3. Rubber powered flying boats.
.. 17/18th	**U.K. CHALLENGE MATCH.** Heathfield, Prestwick. In conjunction with **Scottish PAA Rally.**
.. 25th	**All Brit. Rally.** Radlett, Herts.
Oct. 2nd	Area. ***MODEL ENGINEER CUP.** Team Glider. **GUTTERIDGE TROPHY.** 1st 1956 Wakefield Elim.
.. 2nd	**6th Criterium d'Europe.** C/L speed 2.5 c.c. & supporting events. Brussels.
.. 16th	**AREA K.M.A.A. CUP.** 1st 1956 Glider Elim. **HALFAX TROPHY.** 1st 1956 Power Elim.
.. 16th	**Int. C/L Speed.** Aerobatics & Team Racing. Monaco.

*Plugge Cup Event.
†Including Area Championships.
‡Provisional Venue.

S.M.A.E. CONTESTS IN CAPITALS



Members of the Burma A.M.C. with a collection of their models.

NORWICH M.A.C.

The club champion for March was undoubtedly Roy Carr. His *Pacemaker*, powered by an Oliver Tiger 2.5 won the cup for the best built model of the month and then went on to win the monthly Class " A " team race.

Gamage Day was an unlucky day for the club in all respects. Members were unable to fly on the drome till late afternoon owing to R.A.F. activity and by that time visibility had deteriorated and the wind freshened. As a result of these conditions several contest models were damaged. However, even under these adverse conditions good flights were recorded by Jo Rant and J. Soames in the Gamage and Pilcher respectively.

In anticipation of better weather, model building in the club is on the increase, and judging by clubroom gossip many interesting models can be expected to make their appearance on the flying field in the very near future.

An ideally situated clubroom with all recreation facilities has now been obtained. In view of the change of premises, club night is now held at 7.30 on a Monday at the MAGNA Old Age Pensioners Club, at the junction of St. Augustines Street and Aylsham Road, Norwich.

SECRETARIAL CHANGES

Mill Hill & District M.A.C. J. E. Lane, 84 Hale Lane, Mill Hill, S.W.7.

Ware & District M.A.C. D. Ling, 159, Musley Hill, Ware, Herts.

North Lincolnshire M.A.S. E. Scoles, 6 Granville Street, Grimsby, Lincs.

Chester M.F.C. K. A. Modern, 2 Burton Road, Blacon, Chester.

Thornaby Pathfinders M.F.C. R. Gillow, c/o The Modelman, 74, George Street, Thornaby-on-Tees, Stockton-on-Tees, Co. Durham.

Heanor & District M.A.C. M. Booth, 21 Dalton Close, Aldercar, Langley Mill, Notts.

The HURRICANE IIc

M.A. 207. In this 40 in. span model of a famous World War II fighter, emphasis is on scale rather than "stuntability," but in the hands of experienced fliers it is capable of loops, bunts and inverted flying and can reach 60 to 65 m.p.h. with a Frog 500 engine. By Paul Mansfield. 5s. 6d.

PLANS of this and other control-line models

some of which are listed below

M.A. 34 THE SNORTER. *By Bill Dean.* **Price 2s. 9d.**
A robust trainer for 1-2 c.c. engines. Designed especially for beginners. Span 24 in.

M.A. 40 HAWKER FURY. *By Ron Warring.* **Price 3s. 3d.**
Scale stunt control-line model of simple construction. For 1-2 c.c. engines. Span 19 in.

M.A. 54 PERCIVAL MEW GULL. *By R. A. Twomey.* **Price 2s. 9d.**
Scale control-line for general sport flying. Winner of many *concours d'Elegance* events. For 1-1.5 c.c. engines. Span 25 in.

M.A. 111 DELTA. *By R. Jude.* **Price 2s. 0d.**
An original delta-wing sports control-liner, a fast model for engines of 1-2 c.c.. Span 12½ in.

M.A. 123 BOEING P26A. *By P. M. H. Lewis.* **Price 3s. 6d.**
A scale control-line model of this attractive little pre-war American Army fighter. Span 23 in. Suitable for 1.5 c.c. motors.

M.A. 138 LI'L TOOT. *By A. E. Burch.* **Price 2s. 0d.**
A .5 c.c. stunt control-line model of exceptional performance which is simple and quick to make, with detachable wing. Span 15 in.

M.A. 141 VOUGHT F4U-2 CORSAIR. *By P. M. H. Lewis.* **Price 3s. 6d.**
A fine control-line scale model of the famous U.S. fighter which has been designed around the 1.5 c.c. Allbon Javelin. Span 26 in.

M.A. 151 MIGHTY MOUSE. *By M. Kelly.* **Price 2s. 6d.**
A fast sensitive little control-line stunter, 16-in span, .5 c.c. powered, it will do all the tricks on 30-ft. thread lines.

M.A. 155 CREAM PUFF. *By C. M. Milford.* **Price 2s. 6d.**
A 16-in. span "half A" team racer for .5 to .75 c.c. engines. 60/70 laps at 27/30 m.p.h.

M.A. 174 D.H. 9A. *By E. Fearnley.* **Price 3s. 6d.**
A scale control-line model of the famous 1917 war-plane for 1.5-2 c.c. motors. Span 35 in.

M.A. 176 SKIPPER. *By B. Murray.* **Price 3s. 6d.**
A 5 c.c. powered stunt control-line model with flaps. Span 40 in.

M.A. 183 SPITEFUL. *By J. R. Bishop.* **Price 3s. 6d.**
This appealing control-line scale model of a sleek descendant of the *Spitfire* has been constructed for engines from 1.5-2.5 c.c. Span 27 in.

M.A. 198 BEE 25. *By P. W. Green.* **Price 3s. 6d.**
This robust model has a heavily constructed wing-feature that in no way detracts from its lively performance. Span 25 in.

M.A. 200 NERVENSAGE. *By Wilfred Kroger.* **Price 3s. 6d.**
A winning international class team racer from Germany with clean lines and straightforward construction. Conforms to both F.A.I. and S.M.A.E. Class "A" rules. Span 23½ in.

M.A. 205 ZKB-20. *By G. Brittain.* **Price 3s. 6d.**
This Russian fighter saw service in the Spanish Civil War and in World War II, and the scale model, powered with a 2.46 diesel, looks most impressive finished in the correct colours. Span 22 in.

M.A. 211 PLUTO. *By M. G. Smith.* **Price 3s. 0d.**
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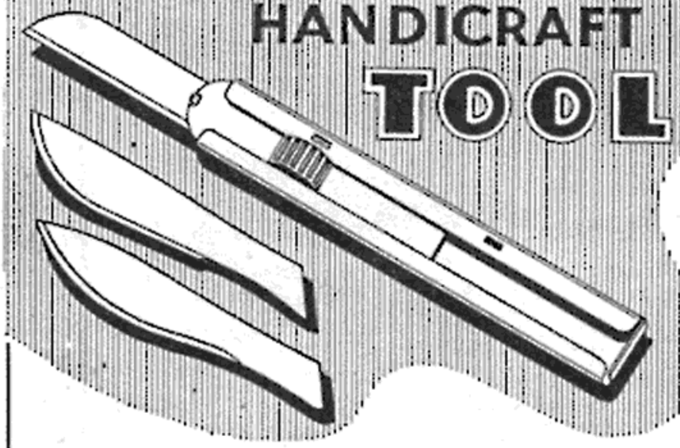

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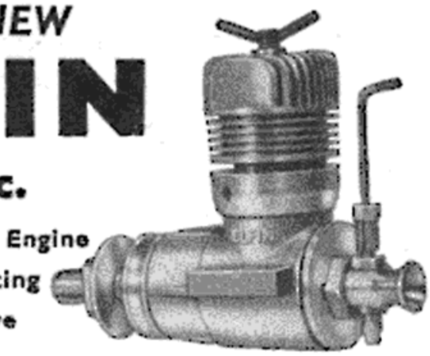

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