MODEL AIRCRAFT

The BRISTOL BULLDOG

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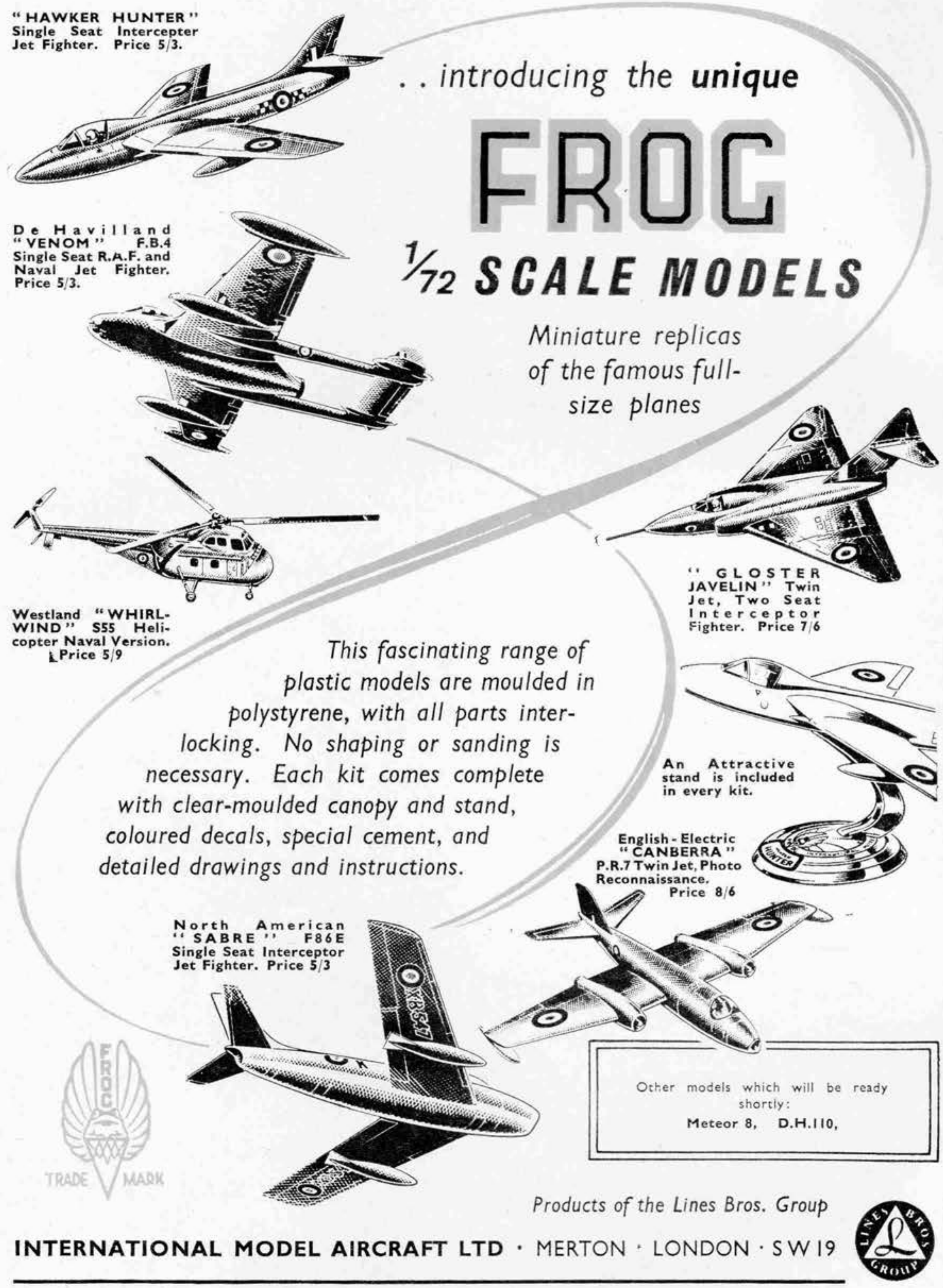
1'6

JULY 1956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Top picture shows an ALBATROSS D-III SCOUT being attacked by a SOPWITH "PUP." Second picture shows an S.E.5 SCOUT being attacked by a FOKKER D.7. Lowest picture shows a FOKKER D.7 as flown by the German "Ace" Richthofen, and as filmed in "Hells Angels." All colours are bright, against blue skies. All squadron markings, insignia, rigging details, etc., are CORRECT. Try any ONE of these three pictures and you will want the other two! If you do this, allowance will be made, so that you pay only the reduced total price of 47/6 for the set of three pictures.

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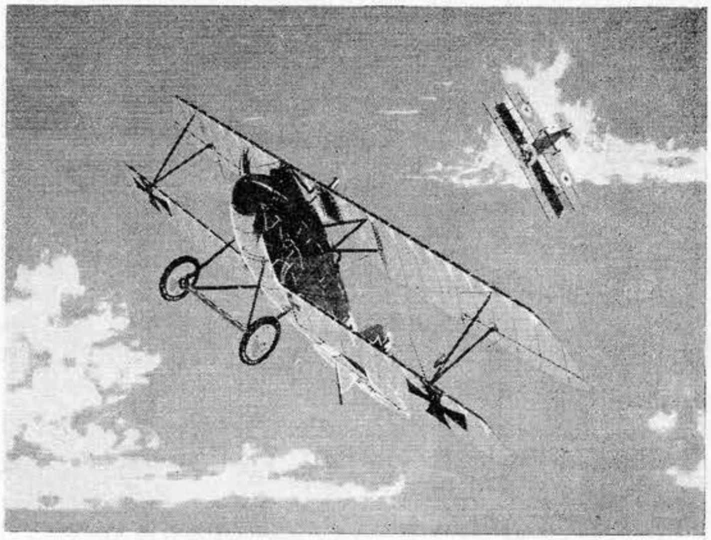

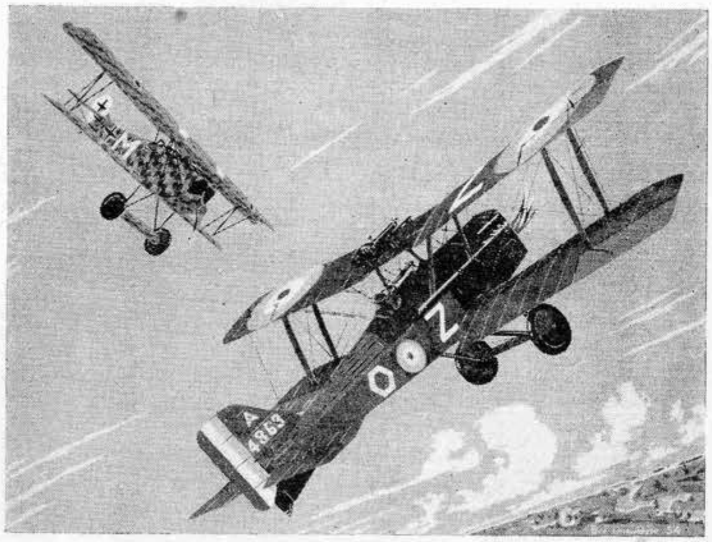

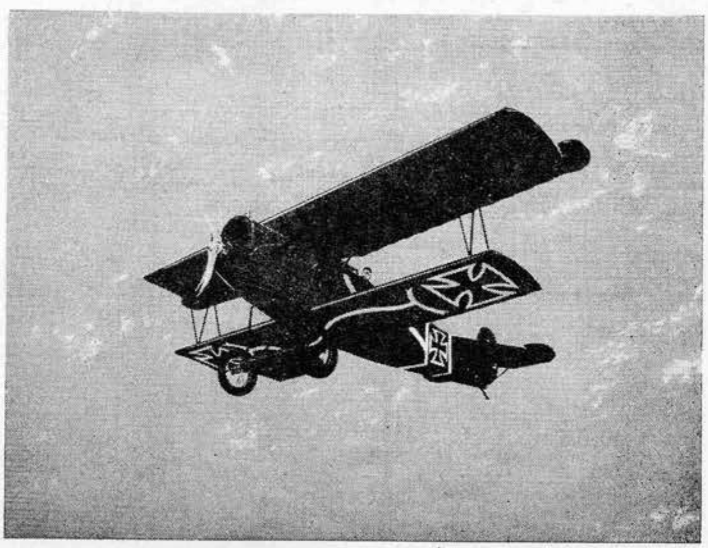

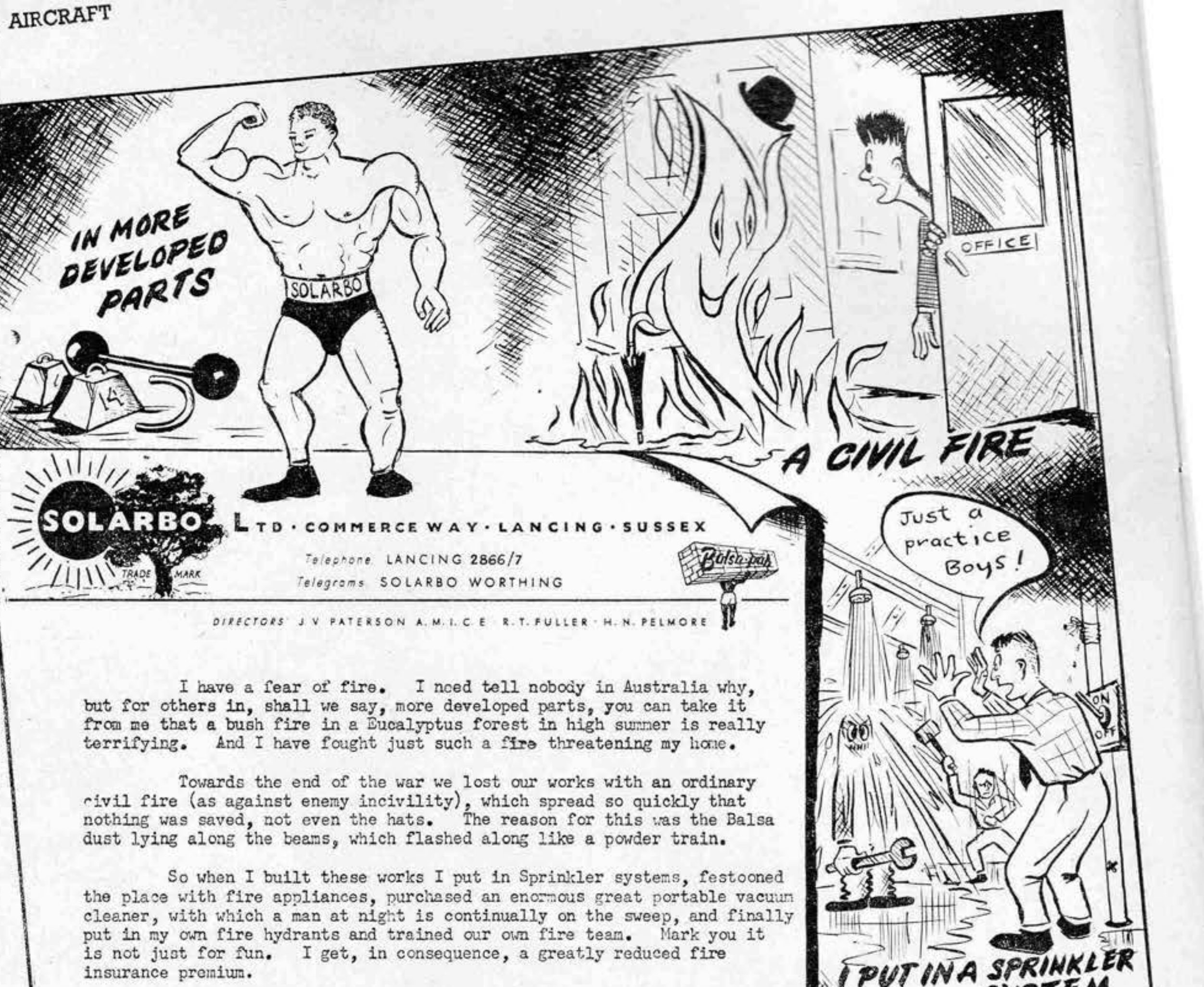

I have a fear of fire. I need tell nobody in Australia why, but for others in, shall we say, more developed parts, you can take it from me that a bush fire in a Eucalyptus forest in high summer is really terrifying. And I have fought just such a fire threatening my home.

Towards the end of the war we lost our works with an ordinary civil fire (as against enemy incivility), which spread so quickly that nothing was saved, not even the hats. The reason for this was the Balsa dust lying along the beams, which flashed along like a powder train.

So when I built these works I put in Sprinkler systems, festooned the place with fire appliances, purchased an enormous great portable vacuum cleaner, with which a man at night is continually on the sweep, and finally put in my own fire hydrants and trained our own fire team. Mark you it is not just for fun. I get, in consequence, a greatly reduced fire insurance premium.

And it paid off the other day with a real live practice on the Works opposite. We beat the local fire brigade by 7½ minutes and had it out before they arrived.

Frankly, I'm more than pleased with this because I'm "awful particular". I must have everything done right, and sometimes people get a little bored with it. At least on the subject of fire precautions they now see the point.

I flatter myself there is always method in my madness. My particular madness leads me to want to produce perfect Balsa all the time. This honourable aim we steadily approach, always doing a little better year by year, but always keeping well ahead of the field.

I have said many times that it is not just a case of buying a piece of Balsa and cutting it into sheets. We should know - we use about 1/10th of all the Balsa produced in Ecuador, and I doubt there is a bigger user, even in America. In England we use more than everyone else put together.

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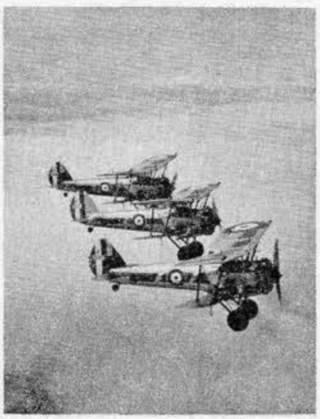
JULY 1956 No. 181. VOL. 15

Contents

Cover Story

To an age satiated with the sleek lines and high pitched scream of the jet engined aircraft, the sight of a Bristol Bulldog, heralded by the throaty roar of its Bristol engine, would excite as much comment as the appearance of a flying saucer. Yet it is but 26 years since these aircraft were our main fighter defence and as common a sight as Hunters and Meteors are today. Our cover photo, taken by Charles E. Brown, shows three of this famous marque—a sight that will gladden the hearts of the "wind in the wires" brigade.



THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

All Radio—No Control

Dear Sir,—Your comments in the June issue concerning contest radio flying are interesting. At the Nationals I watched both radio events and in general your remarks are justified. The average entrant would appear to know all about radio and nothing about models, or vice versa. Perhaps one day a top contest flier and a gen radio man will team up, then we should see results. In the meantime all praise to those few who do put up a consistent performance.

Yours faithfully,
London, S.W.1. J. F. Baxter.

To the Trade . . .

Dear Sir,—Why, why, must a beginner's model be so diminutive? A newcomer to our hobby is not a child in need of a toy, but a person, often an adult, taking the first steps in a fascinating and creative art—proficiency in building and flying model aeroplanes.

The little boy who wants an aeroplane to play with as a change from toy soldiers is well catered for by the many quickly assembled prefabricated kits already on the market. But should there not be something more satisfying to offer the embryo modeller? A simple kit, the end-product of which is a decent size model capable of a real performance, and of withstanding rough treatment.

To imagine that because a model is small it is easy to build is a very great mistake. I tried one myself recently, and the tiny, fragile components were extremely difficult to handle. The clumsy novice could not hope to succeed with a model when an excess of cement will twist a fuselage, a slip of the knife ruin a bulkhead irreparably, and the unpractised sloshing of dope warp miniature wings into complete unairworthiness. Not to mention the microscopic trimming of these midgets, an operation fit to tax the ingenuity of the most skilled.

Were it in my power to market a kit for the beginner, I would base my design on *The Tyke*. This Wakefield model is simplicity itself, but is, of course, large. So I would scale it down to three-quarter size, giving a handy size model of 33 in. wingspan, which, with a 12 in. commercial propeller, should fly almost as well as its forebear.

The result, I am sure, would be a simple, tough and flyable model, capable of holding its own in club events, and

(*Continued on page* 254)

Drop World Speed Champs.

IN the June issue of our contemporary it is questioned "whether speed models continue to merit classification in the World Championship Class," and the view is expressed that they do not. MODEL AIRCRAFT entirely agrees with this view, and we would go further and say that speed model flying *never has* merited World Championship status.

We first drew attention to this subject in our Editorial in the December, 1953, issue, in which we said: "Is there sufficient international interest in C/L speed flying at the present time to justify the holding of the World Speed Championships?" Therefore, in 1953 we came to the same conclusion as our contemporary—that stronger claims for World Championship status could be put forward for team racing or R/C. Truly great minds think alike!

Nothing has happened in the past two and a half years to make us change our minds; on the contrary, the introduction of the "works entries" and professionally-tuned "special" engines has created an undesirable atmosphere in what is supposed to be a purely amateur sport. This aspect, and the comparatively limited interest that there has always been in speed models throughout the world, brings us to the conclusion that the F.A.I. should decide to discontinue the World Speed Championships after this year.

Whether they should be replaced by team racing or R/C is open to question. Team racing, admittedly, is more popular than speed model flying, but as a result of our past experience we cannot help foreseeing a keenly contested World Championship Final ending with a "rough house" in the centre of the circle and plenty of bickering on the outside.

Standardisation of judging is only one of the difficulties that would be involved in substituting R/C and here again we feel that commercialism would inevitably creep in.

To sum up, we fully support the view that the World Speed C/L Championships should be dropped, but we would not replace them with team racing or R/C until either of these has further developed.

World Champs Combined

WE are pleased to see that commonsense has at last prevailed and instead of holding two World Championships on different dates as originally announced, Italy has decided to combine the A/2 and 2.5 c.c. Speed Championships at a meeting to be held at Florence from September 26th-30th.

If the response to the Society's appeal for donations to the International Contest Fund reaches sufficient proportions, a team will be sent to participate in the glider event, but the question of financing a speed team is undecided.

It is unfortunate that British speed fliers, who have in the past been reasonably successful in international events, may not have an opportunity of competing in the World Championships. However, should it be possible to send a team, the 2.5 c.c. Speed Contest results at the Nationals will be used as a guide to selection, but in any case a minimum speed of 190 k.p.h. must be achieved in order to qualify for consideration.

S.M.A.E Change of Sec.

AS a result of the resignation of Mr. D. A. Gordon from the office of general secretary of the society, an emergency meeting of the council was held at Hemswell on May 21st. At this meeting Maj. S. D. Taylor agreed to relinquish the

U.S.A.F. CONTEST at MANSTON

To compete in the Air Force contest at Ellington, Texas, is the ambition of all modellers in the U.S. Air Force, as the winners are eligible to fly in the American Nationals. The U.K.Eliminator was held at Manston, and the winners will by now have competed in the European Eliminators at Wiesbaden, to select those to fly at Ellington. Photos—above, Mrs. Nancy Lewis, chuck glider winner. Right, Members of the Manston Club, A/2c Sargent won C/L scale and A/1c Bartoszewicz (lower left) was the Victor Ludorum.

office of competition secretary and to take over the duties of general secretary with immediate effect.

Mr. B. A. Messom will act as competition secretary until the next election of officers.

Bristol Bulldog

WE would express our thanks to the Bristol Aeroplane Co. for their co-operation in the preparing of the Bulldog feature in this issue.

These MERIT ATTENTION

OUR congratulations to J. O'Donnell on obtaining his International " C " Merit Certificate. John thus becomes the twelfth British aeromodeller to achieve this distinction, which places Britain well in the lead over other countries, none of whom can boast anything approaching this number.

Although there is a general lack of interest in obtaining Merit Certificates, it is felt that this is due not to lack of enthusiasm on the part of modellers, but rather to the shortage of publicity (like so many of their activities) from the S.M.A.E.

Merit Certificates are within the reach of any modeller and they are obtainable in three categories as follows:—

" A " Certificate Three flights of over 2 min., with either a rubber model, power model (max. engine run 20 sec.), or glider (164 ft. line).

" B " Certificate. As for " A " but three flights of over 3 min.

" C " Certificate. As for " B " but three flights of over 3 min. with each type of model.

International Certificate. As for " C " but applicant must hold an F.A.I. Sporting Licence.

The certificates are only issued progressively.

Full details and application from are obtainable from the S.M.A.E. Ltd., 19, Park Lane, London, W.1.

V.H.F. of LITTER

ONLY 24 competitors, but, oh, what a state Cranfield Aerodrome was in after the *Aeromodeller* R/C Contest on April 15th! Empty fuel tins and bottles, paper, etc., were left behind as a token of their consideration to the C.O. for allowing them the use of the aerodrome.

We know it could not have been spectators who were responsible as none was there. The litter could only have been caused by the competitors or their helpers(?), and as a result the S.M.A.E. has received a letter of complaint from the C.O. of this station. We hope that the culprits now feel thoroughly ashamed of themselves—they should do, as whilst this sort of thing goes on it is not surprising that the Society should have difficulty in obtaining the use of aerodromes.

No F.A.I.(t) accompli

THERE has now been time for further consideration of the new rule changes recently introduced by the F.A.I., and it is certain that these will be scheduled for further discussion by the Model Commission. Therefore the rules will remain as they are for 1957.

It is easy to make destructive criticism of new rules, but serious modellers will appreciate that a fly-off in a World Championship Contest is to be avoided if possible, as it tends to defeat the object of limiting the flight times in the contest and re-introduces the possibility of the winner being decided by a lucky thermal.

Many people are in favour of limiting the models' performance without altering the present specification, and this might easily be achieved by reducing towline length, rubber weight (as was indeed suggested) and motor run in the respective classes. Whatever course is decided upon, however, one thing is certain: our delegate on the F.A.I. Model Commission must be *fully* conversant with the wishes of our fliers.

"Mabel! Penelope's eloped with that fellow from the airport!"

1956 DANISH NATIONALS

SUMMING up the 1956 Danish Free Flight Nationals held at Odense Airport recently, our correspondent, Per Weishaupt, says that Wakefield and R/C models show the most improvement in flying performance, with F/F power still of a rather low standard.


Flemming Kristensen, the Danish free flight champion for 1956. Model is powered by a 1.5 c.c. Webra.

Evidently, in spite of the many thermals, there were few maxs., as a large number of models were o.o.s. before the three minutes were up. A.2 winner Borge Hansen's model suffered from d/t failure and landed 15 miles away after crossing the Odense Fjord!

Final results were as follows:— Wakefield: N. Wagner 1st, ·876 sec. A2: Borge Hansen 1st, 681 sec. F/F Power: Flemming Kristensen 1st, 523 sec. R/C: Jan Hackhe, 1st, 16.5 pts. Incidentally the latter used elevator and proportional rudder control and motor stop control. Model was an *Acrobat* powered by an Elfin 2.49.

"GADGET" GIBBS tells you how to build and fly the—

NIPPER

2·5 c.c. World record holder

Ray ("Gadget") Gibbs is without doubt one of the most consistent and successful speed fliers in this country and in addition to his many contest placings he at present holds two of the three F.A.I. world speed records.

In this article he gives constructional details for his 2.5 c.c. *Nipper* model, and passes on some of his incomparable "know how" on the preparation and flying of speed models in general.

The designer with two of his speed models. On the ground is the 129.3 m.p.h. record breaking "Nipper" and he is holding the 5 c.c. machine with which he achieved a speed of 147.1 m.p.h. at the Nationals this year.

THE *Nipper*, so called because it is built to the smallest of the three F.A.I. classes, is an easy model to build and fly, but, as with every other form of competitive flying, practice is necessary for success.

Construction

The bottom half is made of hard wood, so that the screws holding the engine mount, which is made of $\frac{1}{8}$ in. dural, can hold firmly. The top is made of balsa and is constructed from two pieces of block to enable the wing to be inserted and securely cemented. The wing is sanded to section before the grooves are cut for the lead-outs. The tailplane is screwed to the bottom half. This, I think, is stronger and enables it to be replaced easily.

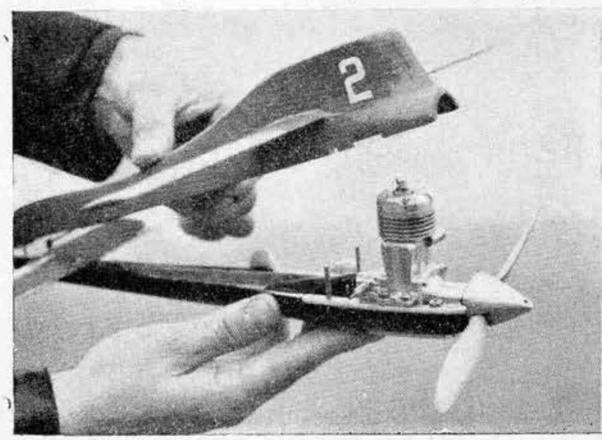
Props

The best props I have found are the American Tornado series; these are very well designed and made, and definitely give increased thrust in the air over any other prop. The right pitch can only be found by trial and error; much depends on how well the model is finished. I do not produce a fantastic finish and have found a 6 in. × 9 in. prop the best, but a very clean model might possibly get away with a 6 in. × 10 in., and of course this should give more speed, but there is no point in using a high pitched prop if the model will not allow the motor to reach its peak r.p.m. With the engine working below its peak it is useless, for one cannot hope to get the speed if one does not let the motor rev.

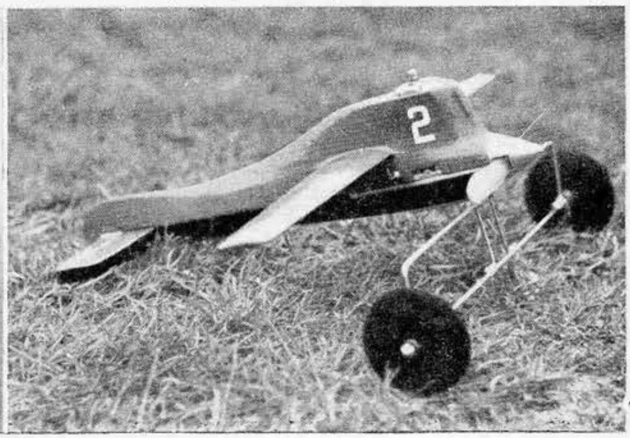
Fuel and Engines

The original model was powered with a glowplug engine, because glow fuel gives greater scope than diesel fuel for experimenting with "hot" mixtures. Also one can use a fountain pen bladder as a tank (diesel fuel will quickly rot these rubber bladders). As a pen bladder feeds under pressure it will give a

Left: Showing how the model separates for refuelling.



Right: On its dolly, ready to take off: not from that surface though!



better engine run throughout the flight, whereas with a tank one has to wait for the motor to come in, which is usually after several laps, so when a tank starts to feed properly, the motor is often too hot for its best performance. With a pen bladder, however, maximum power is delivered from the start, which means that flights can be shorter and there is less wear on the motor.

The best fuel, I have found, is as follows:—

40 per cent. B.D.H. nitro-methane.

30 per cent. Esso methanol.

25 per cent. lubricating oil. (This is very important. *Do not use medicinal castor oil* as it tends to break down at high speeds.)

5 per cent. nitro-benzine. (I found it helped to mix the large quantity of nitro-methane with the methanol and oil and it had no ill effect, in fact it seemed to give the motor a better note.)

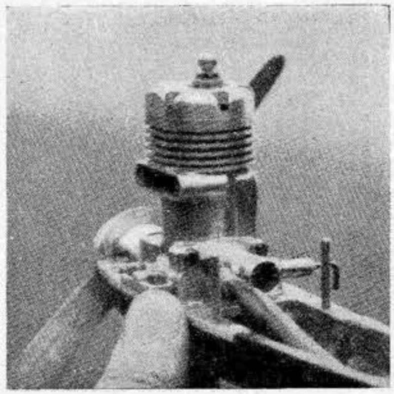
Lines and drop-out

The lines are of prime importance. These should be checked before each flight for kinks and bends. I use a new set of lines every time out, for safety. I do not believe in pull tests no matter what other people say; it is not the actual pull that damages the lines and models but the way it is done. Pulling on one side of the handle, thus stretching one line only, holding the fuselage and weakening the wing and bellcrank fixing, jerking and twisting, etc., cause more failures than any amount of flying.

For F.A.I. contests a drop-out is needed, but for normal use the easy way out is hand launching. The *Nipper* can be hand launched with safety, and with the constant feed from a pen bladder there will not be any fading out after launching as is liable to happen with a normal tank. If a drop-out is used make sure it drops out easily, otherwise you will find yourself flying with it still attached, and, believe it or not, the model will fly quite well, only much slower.

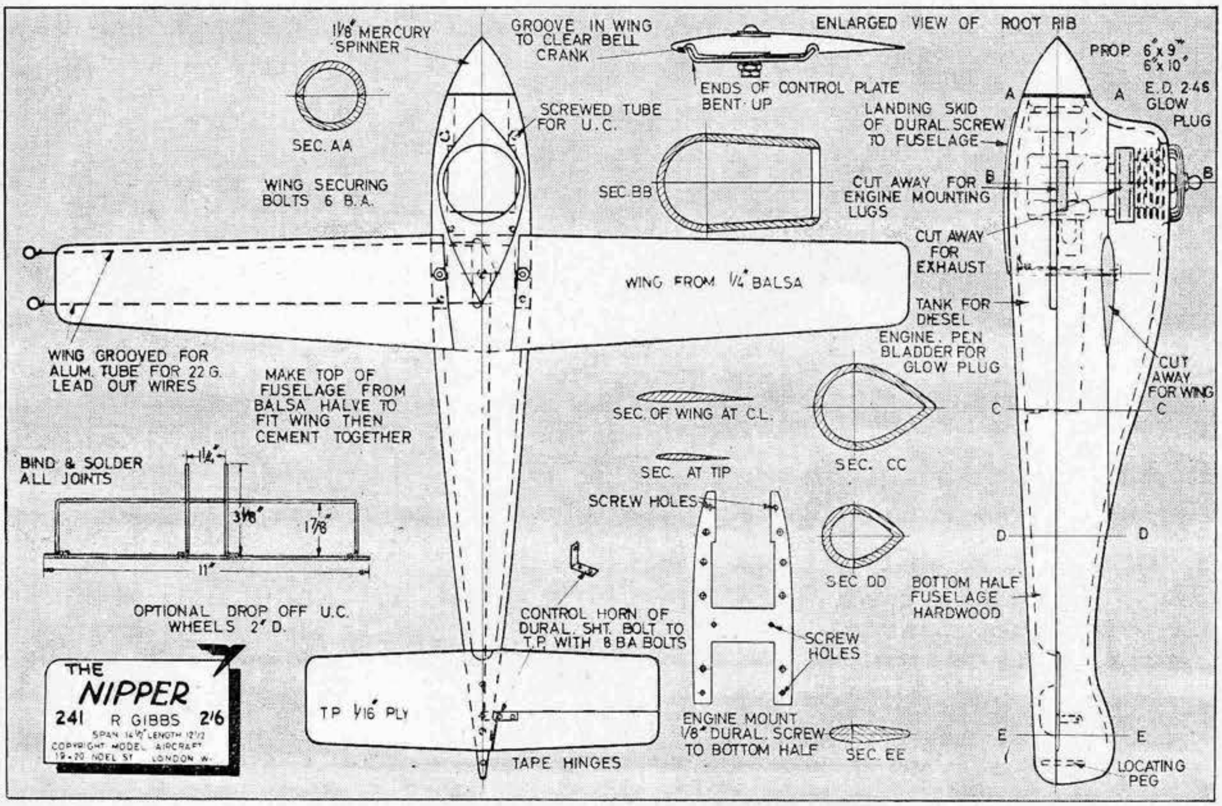
Taking off and flying

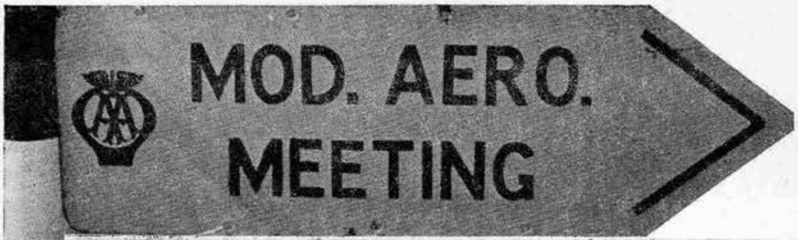
The model, even though lined up straight and set off level, will tend to run out. This I cannot account for, but it seems to happen with every model. It is, however, quite safe provided you do not pull on the lines. The person who releases the model plays a very important role. It is no good having someone who is nervous and shaky. The way the model takes off depends entirely on how it is released. If it is set off pointing into the circle, you have had it; if, on the other hand, it is pointed out it will tip over on one wing. The only way is straight.



Close up of the 2.5 c.c. Carter engine which powered the original model. The pen bladder tank can be clearly seen.

For hand launching, the lines must be kept tight and the model launched smoothly and pointing out from the circle. Once airborne it handles very well and is easy to fly, and remember it is not necessary to break records to win contests.





THE NATS

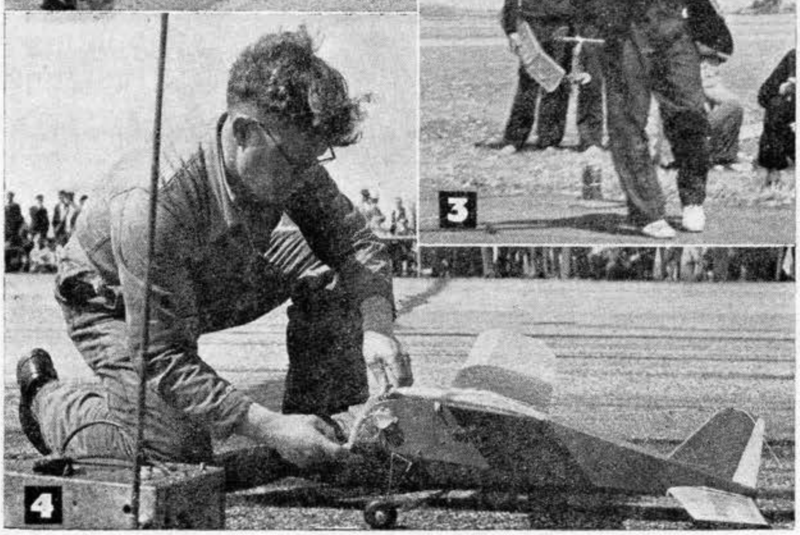
held at R.A.F. Hemswell

A LAST minute change of venue from Waterbeach to Hemswell in no way decreased the attendance of modellers at this year's Nats., although spectators were fewer than is usual at this premier meeting. Accents too, were noticeable by their variety—Scots, broad Yorkshire, Welsh and a host of others, and all laid emphasis on the words British Nationals.

Organisation of the contests for the most part was first class, thanks to the stalwarts who kept to their gaily striped tents despite the tempting flying weather.

As always, spectators present congregated at the R/C and C/L flying points. Watching the former, we were disappointed in the standard of flying. However, both the S.M.A.E. Trophy and the Taplin Trophy were well supported, but for two contests that purported to be for aerobatics and precision respectively, we could discern little difference in the average flight patterns of either. Henry J. Nicholls and Col. Bob Yates did an excellent job on the tarmac, and we particularly liked Henry's "no nonsense" handling of both competitions. J. Nixon is to be congratulated on showing the multis the way home on both days by scoring one of the few double firsts to be won at a Nationals in a contest of any type.



1. Pete Hedgeman's (Hayes) glider, with Josh Marshall waiting for his helper to finish breathing on the fuse.
2. Neald's (Cheadle) radio model being hand launched—unfortunately it crashed immediately after becoming airborne.
3. A smart getaway in the Shelley by T. Rhead of Wigan.
4. R. Donohoe, second in the S.M.A.E. Trophy, with his A-M 25-powered single channel design. Model had most impressive climb in the contest.

Henry J. and Bob Yates certainly didn't allow the Radio competitors to get out of control.

A few hundred yards further along the runway the C/L circles were kept busy on both days. On Sunday the Gold Trophy attracted a comparatively large entry, but apart from the few acknowledged experts, the standard of flying was not particularly high. With but one stunt contest per year, this is perhaps understandable.

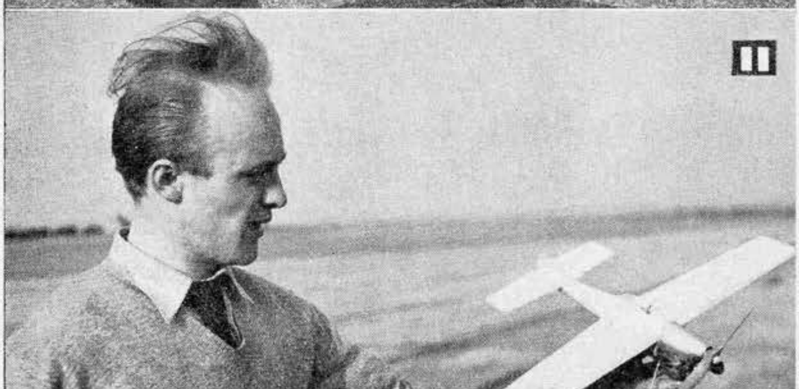
Team racing (Class A Sunday, Class B Monday) showed a definite falling off in entries, although the average standard—particularly in Class A—was as high as ever. Class B would appear to have been affected most by the fewer entries, which doubtless accounted for its early completion (4 p.m. final).

Congratulations to Ray Gibbs on his magnificent 147.1 m.p.h. in Class 2 Speed. Subject to ratification, this increases the world record (which Gibbs already holds) in this class. Though speed flying has limited appeal (see "Here and There"), it is nice to reflect that Great Britain can produce models and motors which are as good as any in the world.

Wandering around the F/F comps., the most interesting flight pattern observed was that of Ron Ward's P.A.A. winner. On each flight this model stayed into wind, soaring in the lift off the slope at the edge of the 'drome. In the other F/F contests the models followed more conventional trimming ideas and the general standard of flying was very high. Most thrilling fly-off was undoubtedly

NO FLYING SAUCERS—BUT PLENTY OF DIRTY ONES!
A PEEP AT THE 'IN-TENTS' ACTIVITY AT HEMSWELL!

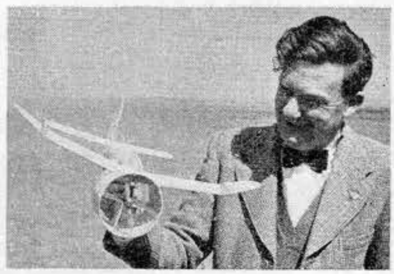
5. Only 3 seconds behind the winner! S. Marshall stacking them on for the fly off
6. Eric Fearnley entered his beautifully built Colonial "Skimmer" in the Scale.
7. Adjusting for those last few revs is Ken Glynn of Brixton, in the P.A.A. event.
8. P. H. Ball (Leicester) makes final adjustments to his scale Sopwith Triplane.



THE NEXT "HEAT." A FIREY FURNACE IN THE T/R. PITS.

for the M.A. Trophy, which Cartwright won by a mere three seconds. Ford in the power unfortunately had an over-run, and consequently returned no fly-off score, thus leaving Smith the winner. Boxall secured a comfortable 4 min. lead over E. Cartwright (N. Lincs.) to win the glider.

The scale contest entries showed some excellent workmanship, and all six retired to the runway for their qualifying flights, which unfortunately depleted the possible " placers."



Ray Malmstrom's prop-in-a-barrel-design.

As there were insufficient competitors, the Bowden Trophy was declared a no contest.

Liaison between the organisers and the R.A.F. was effected by F./O. Goodnough, of whose unceasing efforts to ensure the pleasant running of the meeting we cannot speak too highly. East Midland Area Secretary W. L. Trotter and his helpers also gave unstinting service in the arrangements, both before and during the contest. In fact, thanks are due to all who contributed to the undoubted success of the 1956 Nats.

RESULTS ON PAGE 271

9. Shelley entrant A. Sedgebeer (Marston) makes final needle adjustments.
10. Brian Faulkner of Cheadle, second place P.A.A. winner, prepares to start up.
11. Second place for the Scots; Jimmy Muir of Prestwick M.A.C. holding the Class A racer which he jointly constructed with entrant Brian Harris.
12. No push there! Dave Posner releases his P.A.A. model.

ALL THE WINNERS

13. Historical moment! The Class B T/R finished at 4 p.m. The winning Chingford team, W. Martin (right), his brother (pilot, centre), and Sid McGoun, mechanic.
14. J. Cartwright of Hull Pegasus won the Model Aircraft Cup after a 6 : 54 fly off time. Here he receives his prize from Wing Cdr. Russell Bell.
15. J. Marshall of Hayes launching his twin geared tailless rubber model on one of the flights that won him the Lady Shelley Cup. He was second last year.
16. "Gadget" Gibbs is congratulated by the Wing Commander on winning Class 1 and 2 Speed and setting a new record in the latter with 147.1 m.p.h.
17. J. Nixon had a field day (or weekend ?) winning both Radio events with his single channel model with coupled engine control.
18. The Boxall Brothers of Brighton waiting to fly in the M.A. Cup. Fred (left) was previous day's Thurston Cup winner.
19. Tom Smith flew one of his swept forward wing Oliver Tiger models to win the Shelley with a fly off time of 6 : 39. Note starting stick!
20. P.A.A. winner Ron Ward of Croydon receives his prize from Wing Cdr. Bell.
21. Pete Russell of Worksop won the Gold Trophy for the second year running. Semi-scale model used moded E.D. 2.46.
22. Quentin Wilson of Maybole with his Super Scale-winning Prestwick "Pioneer."
23. Davis Class A Winner Howard of Forresters (right) won with this model, which he also flew in the Criterium d'Europe.

Aviation NEWSPAGE

by J. W. R. Taylor

Left. The F-104A production version with the faired-in air intakes.

Flying shot on the right is of the XF-104 with the old type air intakes.

THE WRAPS ARE OFF Lockheed's F-104A *Starfighter* at last, revealing a stub-wing interceptor that looks equally frightening for the airmen behind and in front of its guns. Despite which, test pilot Joe Ozier has said that it is the easiest aircraft to take off and control of any he has flown. Certainly, it should have no difficulty in getting off the deck and up, because it weighs about 15,000 lb. in fighting trim and its General Electric J79-GE-3 turbojet gives over 16,000 lb. of thrust with its afterburner cut in. As a result, the F-104A will climb at its limiting level speed of around Mach 1.9 (1,250 m.p.h.), when its engine develops half its power as a ramjet.

Nevertheless, most pilots prefer wings that span more than 7½ ft. from root to tip, especially when landing, and the touch-down of the *Starfighter* is hot by any standards. With a t/c ratio of 3½ per cent., the wings are the thinnest ever flown. They have 10 deg. anhedral, because their span is so nearly the same as the height of the fin above the fuselage that the rudder tends to act as an aileron, and anhedral is the best way to counter the resulting tendency to roll.

Nose radius of the wing section at 0.016 in. is so "sharp" that it—and the ground crew—are protected by felt covers on the ground. The end-plate effect of tip-tanks, which fit over the ends of the wings like gloves, is equivalent to an increase of span; and the leading edge can be dropped 20 deg. to improve control at the lower end of the speed range.

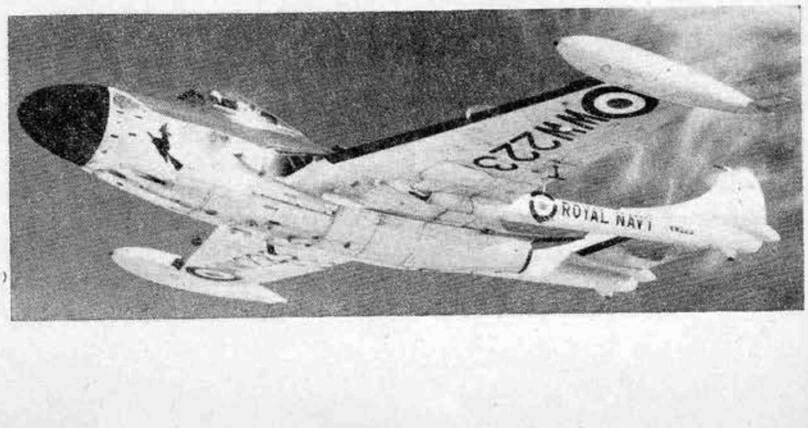
Considerable lift is, of course, produced by the needle-nosed fuselage, which is a simple structure housing cockpit, armament, engine and fuel for about 1,000 miles of flying. Interesting features include a downward ejection seat, necessary to clear the T-tail, the revolutionary Vulcan gun which slings out 20 mm. shells at fantastic rate for 5 sec. from multiple revolving barrels, and the still-secret air intakes, which are believed to have a central spike to produce the right kind of shock wave to boost engine power at max. speed.

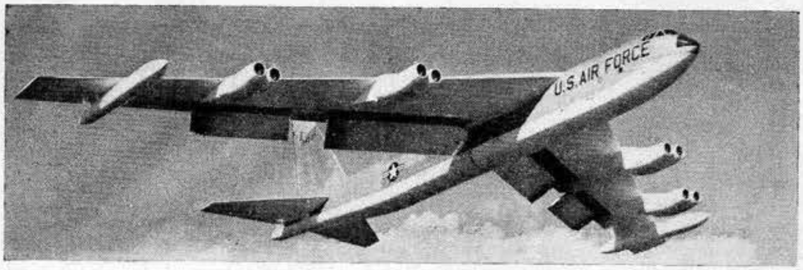
The *Starfighter* has a simplified, but not stripped down, structure, giving it an empty airframe weight half that of other comparable types. The F-104A is rolling off the assembly lines in quantity already, with TF-104A two-seat trainer and F-104B two-seat fighter versions following hard behind.

* * *

WITCH-HUNTERS. Latest Fleet Air Arm insignia is the black witch-on-a-broomstick displayed on the nose of the *Sea Venom* 21 all-weather fighters of No. 890 Squadron. Formed in February of this year at H.M.S. *Heron*, Yeovilton, Somerset,

Neat cabin job below is a Japanese conversion of the Beechcraft Mentor two-seat trainer, while the bottom photo depicts a Sea Venom 21 with the witch insignia.





Above, big brother of the B-47 is the B-52c with the large external fuel tanks fitted beneath the wingtips. Right, the NHI H-2 Kolibrie.

the squadron is commanded by Lt.-Cdr. P. S. Brewer, R.N.

* * *

BIGGER AND BETTER STRATOFORTRESS is the new B-52C version as illustrated above, which has an all-up weight of around 400,000 lb. Main visible change is the fitting of two extremely-large external fuel tanks under the wingtips. No hint of their capacity has been given; but they look far bigger than even the 1,700 gallon Fletcher-built tanks now carried by B-47 *Stratojets*.

Proof of the tremendous production capacity of Boeing is that production of the B-52C at Seattle and similar B-52D at Wichita was recently stepped-up to a total of 20 aircraft a month. For a comparison, the *Brabazon* weighed 290,000 lb. and the *Princess* flying-boat 320,000 lb.

* * *

HELICOPTER FROM HOLLAND is the little two-seat NHI H-2 *Kolibrie*, which has recently been fitted with a full-depth windscreen and tail rotor. A 50 h.p. ramjet is mounted at the tip of each of its two all-metal, bonded rotor blades, which have automatic stability and transfer automatically into auto-rotative pitch in case of engine failure. The rotor is turned initially by a 1 h.p. bicycle engine. Max. speed is 70 m.p.h. at a loaded weight of 1,350 lb.

* * *

REDESIGN IN JAPAN by the Fuji company has turned the Beechcraft *Mentor* two-seat trainer into a neat general-purpose liaison and light cargo plane designated the *LM-1 Nikko*, and the two aircraft are being mass-produced on parallel assembly lines for the Japanese Self-Defence forces.

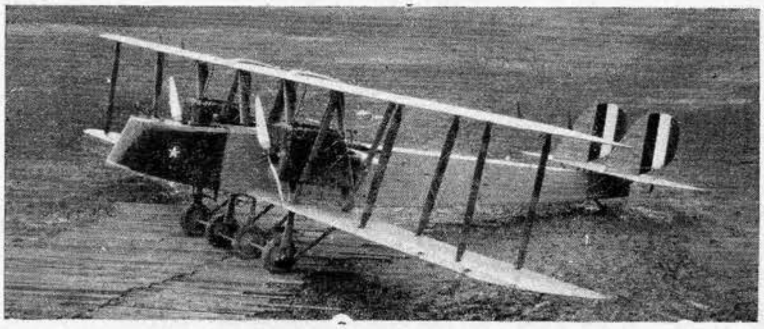
Modification of the cabin has provided room in the *Nikko* for four to five persons or, alternatively, a stretcher and attendant, survey camera and operator, or 700 lb. of bulky freight, which is loaded by removing a large portion of the cabin-top. With the same 225 h.p. Continental 0-470-13A flat-six engine as the *Mentor*, the *Nikko* has a top speed of 185 m.p.h. at sea level and normal range of 945 miles, which is sufficient for non-stop flight to any part of Japan from Tokyo.

* * *

LATEST NEWS OF U.S. JET-LINERS is that an undercarriage mod. has put up the loaded weight of the intercontinental Douglas DC-8 to 287,500 lb. Boeing's counterpart, the Model 707-320, weighs an estimated 290,000 lb., which raises a problem for future operators as it requires a runway length of 9,000 ft. under International Standard Atmosphere conditions. This means that only Casablanca Airport is at present big enough to handle the DC-8 and 707-320: other airports will have to get busy with the picks and shovels at an average cost of £10,000 for every 100 ft. of runway extension.

All of which reminds us of the Englishman who asked for a small tube of toothpaste in a New York drugstore and was told "Listen, bud, in this country toothpaste comes in three sizes—large, giant and super—so if ya wanna small toob, ask for large, get me?"

FROM THE PAST . . . . No. 3



The Martin G.M.B. Bomber

THE Martin G.M.B. bomber caused about as much excitement in its day as Lockheed's new *Starfighter*. With U.S. airmen compelled to fight in France in aircraft of British and French design, the American industry was in the dog-house in January, 1918, when Glenn L. Martin went to Washington with plans for a powerful new twin-engined bomber.

He was given a contract, and the prototype G.M.B., America's first multi-engined bomber, took off only six months later. Powered by two 400 h.p. Liberty 12-A engines, it carried a three-man crew and 1,500 lb. of bombs and had a top speed of 113 m.p.h.

Ten of the original G.M.B. version were built, the last of which was converted into the 12-seat T-1 transport. They were followed by 130 MB-2 (later redesignated NBS-1) versions, with 420 h.p. Liberty motors and a crew of four. They were just too late to help win the 1914-18 war, but seven of the MB-2s started another war in 1921, when General "Billy" Mitchell used them to sink several old battleships at sea. Claiming this proved the obsolescence of sea power, he crossed swords with senior U.S. officers, was court-martialled and sacked.

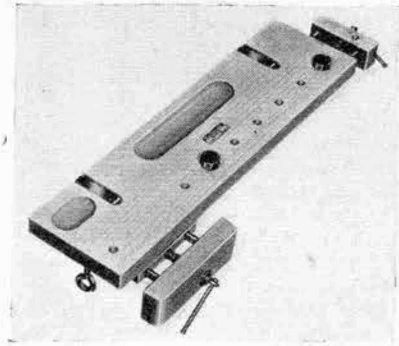
Experimental versions of the MB-2 were the first U.S. aircraft to carry a 37 mm. cannon in 1919 and a 2,000 lb. bomb in 1922.

OVER THE COUNTER

A new item of equipment which should prove useful to the modeller with limited working facilities is the Multicraft Table Top Workbench. It is a small but practical work-bench which clamps on to any table, and is fitted with two vices which permit planing, drilling, assembly and constructional operations. An ingenious series of holes and pegs serves as stops to retain the work in any position. It is 21 in. long and sells at 37s. 6d.

Six months of extensive testing have gone into the proving of Cellon's new epoxy resin fuel proofer, shortly to be marketed by Mercury Models. This proofer is absolutely resistant to even the most highly "doped" fuels (e.g. fuels with a 40 per cent. nitromethane content plus 10 per cent. nitrobenzene, which is about the most "corrosive" mixture possible for ordinary dope finishes).

A feature of this epoxy resin finish is that for satisfactory brushing on, the 50-50 mixture of resin and catalyst requires thinning with 10 per cent. brushing thinners. The coating is touch-dry in about two hours and fuel resistant in about 24 hours. However, it does not achieve its maximum "proofing" strength until seven days after application.



Above. The Multicraft Table Workbench.

Left. The Lubristyl pocket oiler which places oil precisely where required and sucks back any excess; available with choice of three needles, it sells at 12s. 6d.

Two Beginners' Models From *CONTEST KITS*

The kit of the *Captain* we handed over to an 11-year-old boy to try completely on his own. In about four or five hours he came up with a very creditably finished job, no snags and the only part open to criticism was the covering of the wing. That, the kit manufacturers can do little about! But as far as presenting a simple beginner's towline glider which really *can* be built by the inexperienced, Contest Kits appear to be right on the mark with this model.

Flying performance is really good for a model of this size and it does tow straight. The fixed (cemented on) tail surfaces are a help here, for one common fault in the early stages of flying is not to notice that the tailplane has been knocked out of line in a previous landing. Fixed settings do give a more consistent performance.

The *Cranfield*, which is a 27 in. span rubber model, has obviously been designed with a view to getting out of the rut of the orthodox slabsided cabin fuselage layout. The basic fuselage is box-type, but the addition of sheet stringers to the nose and $\frac{1}{16}$ in. sq. stringers to the top of the rear fuselage does result in a "rounded" appearance. Tapered wings and twin fins are additional features. But it makes up a rather heavy model.

Simplified propeller construction is used to get round the difficulty of the average customer in carving his own propeller, or the cost to the manufacturer in giving a finished propeller in the kit. It should do the job all right and its 12 in. dia. prop is duration size for performance.

We would class this design as a rugged sports model. Construction is definitely more advanced than the *Captain* and the plan could possibly have been a little more "instructional" on one or two points. The kit itself is attractively produced and boxed.

High Wycombe C/L Meet.

Derek Allan of the Boreham Wood Club with his interesting swept forward wing, Oliver Tiger powered Team Racer. Model was entered in the class "A" at this meeting.

WANT to fly in combat? Then blow the dust off that old "box car" stunt model and take it along to a contest. Flying one of these, and with the help of a wing borrowed from Stoo Steward to replace the original which was minced in the semi-finals, Ray Ferguson of Chingford put on a masterly display of "stalking" to emerge triumphant from the four in a circle final which thrilled the spectators at High Wycombe's second rally. Second place went to Grimmett of Bromwich, who was using a flying wing design.

The ease of construction and comparative crashproofness, when covered with nylon, of flying wings, are making them very popular for combat flying, where the mortality rate is usually higher than the productivity of even the most rabid enthusiast.

There is little doubt that combat is rapidly usurping the popularity of team racing and we hope that it will not follow the same pattern, where now, the average enthusiast, with his over the counter engine, stands little chance of winning.

Team race honours were evenly distributed about the country, Class A going to Harding (Sidcup), Piacintini (Salisbury), and Rhodes (Forresters), in that order, while Class B was won by Walker (Enfield) with Rowley (Heath A/M) second and Ken Muscutt's veteran *Jack of Diamonds* third.

The High Wycombe Club are to be congratulated on an excellent contest (with first class weather this year), while entries from as far afield as Salisbury in the south and Wakefield in the north show that there are still some keen types who are prepared to brave the dangers of weekend motoring for the sake of their hobby.

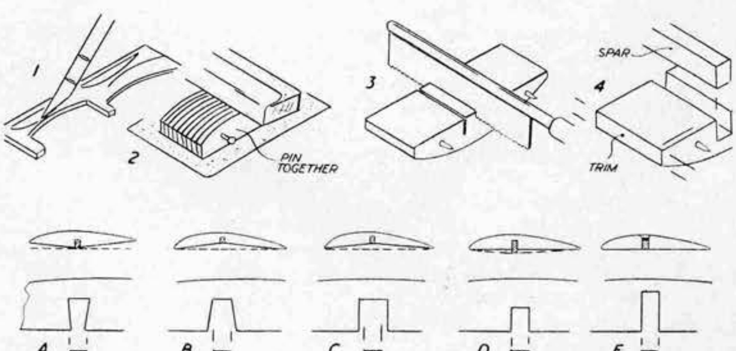
SLOTS FOR SPARS

Don't boob when making up a wing frame. Just those few extra minutes taken to make sure that the ribs fit the spars properly will distinguish between a poor and a good job.

Where ribs are cut from sheet, the rib notches are probably the most difficult part to cut accurately. Common fault is to cut the notch slightly wedge shape, in error. The effect, shown exaggerated, is a distortion of the section when it is finally assembled.

The badly fitting notch A will have to be forced open, giving the rib an inverted camber (or breaking it if the fit is too tight). Notch B may seem much better because it is oversize and at least the rib will fit. But when the cement contracts on drying the section will again warp. A very similar effect can be produced by making the rib notch parallel but too wide—C.

D seems such an obvious fault that it is scarcely worth describing, but this is the most common error of all! Quite often the notch is originally cut deep enough, but perhaps has a taper like B and the rib is never pushed right down. It is difficult to trim the spar down flush after the wing frame is finished without seriously weakening the wing structure.



Cutting the rib notch too deep "to be on the safe side" weakens the top of the rib unduly and it may well break—E. The only real answer, in other words, is a properly matched notch in each rib.

When all the ribs have been cut out (1)—and incidentally it is a good idea to use a steel ruler as a straightedge for making all straight cuts—pin them together in sets (one for each wing panel). Rub over a sheet of fine sandpaper to smooth the bottoms and blend to a uniform surface and use a sandpaper block to give the upper edges similar treatment—(2). Do not sand away so much wood that you distort the section, but the block of ribs when finished should be a perfect match with parting lines between them more or less invisible.

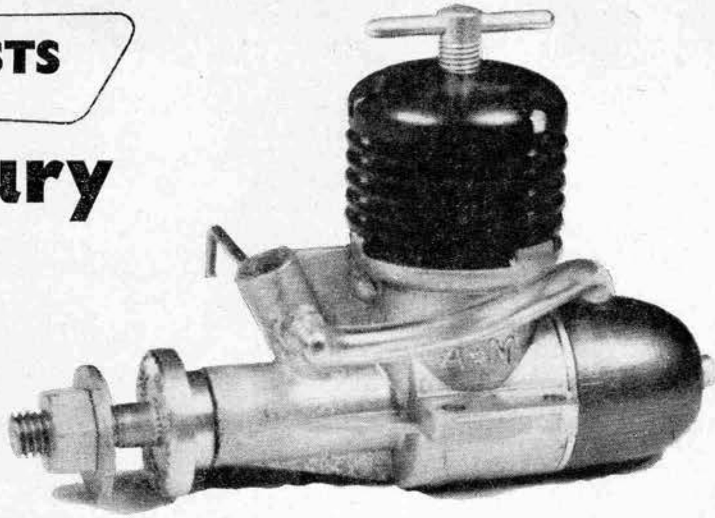
Cut notches for spars and trim the leading and trailing edges whilst the ribs are still pinned together. A razor saw is excellent for cutting in the sides of notches (3), to the exact depth required. You should then easily be able to channel out the notch with a fine pointed blade.

Still with the ribs pinned together, check that a sample length of spar is an exact fit in the rib notches (4). The spar should be an easy sliding fit, bedding down perfectly flush with the bottom of the ribs. If necessary, further trimming of the notch can be done with a flat warding file.

M A ENGINE TESTS

Allen-Mercury A-M 10

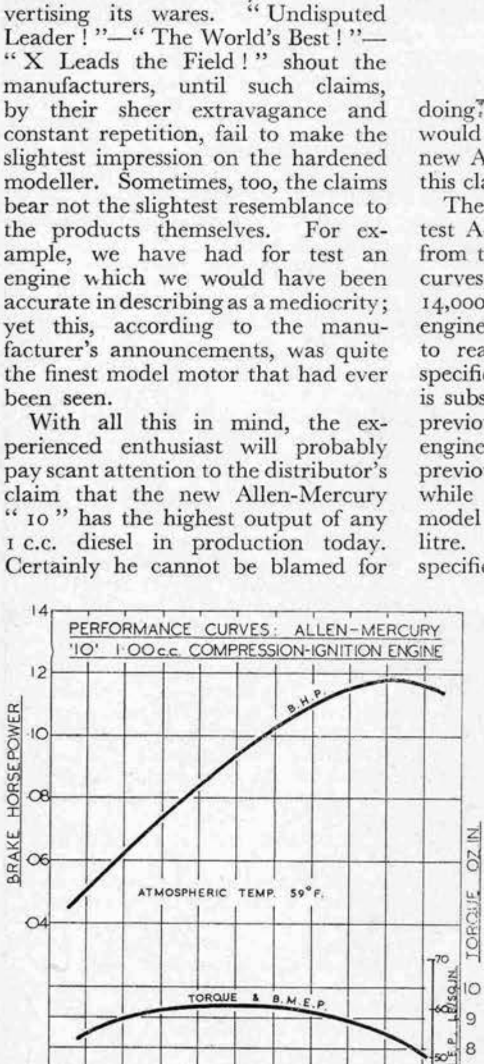
1.00 c.c. diesel



IN general, the model trade is not noted for modesty when advertising its wares. "Undisputed Leader!"—"The World's Best!"—"X Leads the Field!" shout the manufacturers, until such claims, by their sheer extravagance and constant repetition, fail to make the slightest impression on the hardened modeller. Sometimes, too, the claims bear not the slightest resemblance to the products themselves. For example, we have had for test an engine which we would have been accurate in describing as a mediocrity; yet this, according to the manufacturer's announcements, was quite the finest model motor that had ever been seen.

With all this in mind, the experienced enthusiast will probably pay scant attention to the distributor's claim that the new Allen-Mercury "10" has the highest output of any 1 c.c. diesel in production today. Certainly he cannot be blamed for doing so. Yet, in this instance, he would be completely wrong, for the new A-M "10" certainly bears out this claim and more.

The maximum power output of our test A-M "10," it will be observed from the accompanying performance curves, reached 0.118 b.h.p. at 14,000 r.p.m. Students of model engine performance will be quick to realise that this is equal to a specific output of 118 b.h.p./litre and is substantially in excess of anything previously reached with a 1 c.c. engine, the best of which have not previously exceeded 90-95 b.h.p./litre while a typical "popular" 1 c.c. model achieves only about 65 b.h.p./litre. It is also one of the highest specific outputs yet realised with any model diesel, irrespective of size. In fact, as the M.A. Engine Tests series has shown, there are only two other model diesels, at the present time, capable of equalling or surpassing this performance, namely the 2.43 c.c. Oliver Tiger III (0.305 b.h.p. or 124 b.h.p./litre) and the 2.45 c.c. Webra Mach-1 (0.295 b.h.p. or 120 b.h.p/litre), both of which are, of course, international class competition engines, recognised as being the best of their type.



It must be mentioned that our test figures for the A-M "10" relate to a single test sample only as submitted by the trade distributors, Messrs. H. J. Nicholls Ltd. However, we are assured by Henry Nicholls that this was, in fact, a perfectly standard "off-the-shelf" model which had had no more than 5 minutes' running and we are further informed that a rough check on the performance of another stock example showed an output of 0.121 b.h.p.

The substantial improvement over existing small diesel standards of performance by the A-M "10" must inevitably raise the question "how has it been achieved?" The space allotted to these reports does not allow the inclusion of a detailed design analysis (such analyses, on outstanding engines, are to be found, from time to time, in our other engine features) but we can, at least, sum up.

The A-M "10" is a perfectly normal design in so far as it is a shaft valve, plain bearing, radial port diesel. Its performance comes, not from any one feature, but from an intelligent interpretation of the more desirable features of such a layout, which features have been harmoniously blended to produce a well-balanced design. (Here, incidentally, it is especially refreshing to find that the designer admits the engine has exceeded his own expectations.) Of the many features influencing two-cycle engine design, three factors (to which most others are, in any case, allied) assume prime importance. These are (a) adequate and balanced porting, (b) the prevention of excessive friction in the moving parts and (c) the prevention of overheating and/or thermal distortion.

In the first, the A-M "10" looks no different from many other engines and, like any other, its porting has to be a compromise, but in this case, aided by a slightly higher than average stroke/bore ratio and a suitable cylinder design, the compromise appears to be a particularly well-chosen one. Secondly, the reduction of frictional losses is taken care of by a well-fitted piston and cylinder in which the cylinder bore is convergent towards the head in order to combine good compression seal with reduced piston drag over the major part of the cycle. In addition, bearing surfaces are of adequate area.

Finally, the engine is notable for the rigidity of its construction and especially for its quite exceptionally heavy cylinder, which, by its considerable mass, must greatly improve efficient heat dissipation and eliminate any risk of localised overheating and distortion. The liner is, in fact, of some 5/64 in. wall thickness above the ports.

Specification

Type: Single-cylinder, air-cooled, reverse-flow-scavenged two-stroke cycle, compression-ignition. Shaft type rotary valve induction. Circumferential exhaust and transfer porting. No sub-piston supplementary air induction.

Swept Volume: 1.000 c.c. (0.0610 cu. in.).

Bore: 27/64 in. Stroke: $\frac{7}{16}$ in.

Compression Ratio: variable.

Stroke/Bore Ratio: 1.037 : 1.

Weight: 3.0 oz.

General Structural Data

Pressure diecast crankcase and main bearing housing in LAC.112A alloy. Crankshaft of S.14 steel, case-hardened, with full-disc web and running direct in crankcase material. Splined shaft end for prop driver. Meehanite cylinder liner. Duralumin finned cylinder barrel. Cylinder assembly clamped axially to crankcase by three long screws passing through cylinder barrel into crankcase. Meehanite piston with full-floating gudgeon pin. Connecting-rod machined from forged dural bar. Spray-bar type needle-valve. Beam mounting lugs.

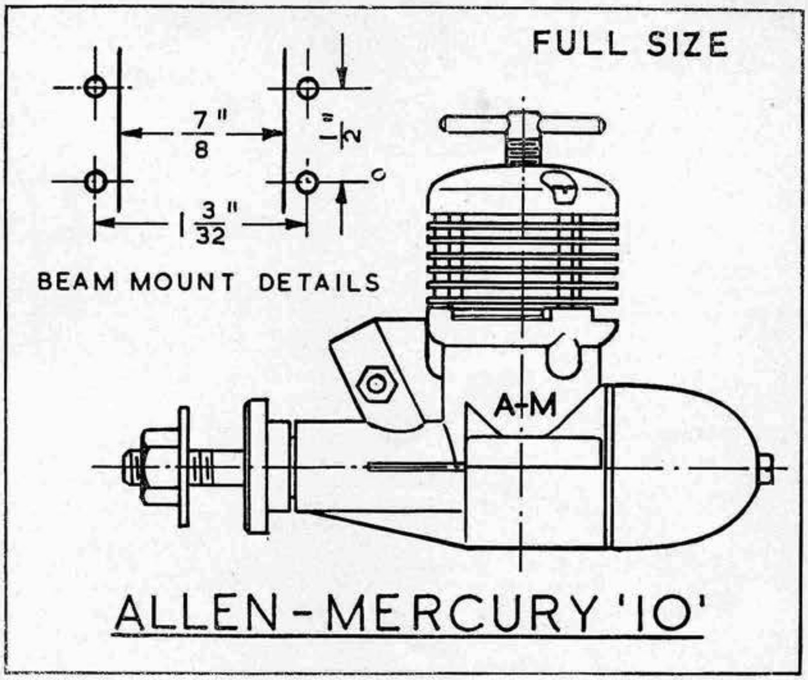
Test Engine Data

Running time prior to test: 2 hours.

Fuel used: $37\frac{1}{2}$ per cent. technical ether BSS.579, 20 per cent. Shell " Royal Standard " kerosene, 15 per cent. gas oil, 25 per cent. Castrol M, $2\frac{1}{2}$ per cent. iso-amyl-nitrite.

Performance

The high maximum b.h.p. output of the A-M " 10 " has already



been remarked upon. It remains only to say that a proportionately high level of performance is available at speeds below the peaking speed. In other words, the performance comes not merely from the engine's ability to rev, but from unusually high b.m.e.p. Thus, the maximum torque, which is developed in the region of 10,000 r.p.m., was 9.4 oz. in., equivalent to a b.m.e.p. of slightly over 60 lb./sq. in., which is a much above average figure for model two-strokes, irrespective of size and type. By way of comparison, the average for seven 1 c.c. engines previously tested in this series was only 47.9 lb./sq. in.

Handling characteristics in general were good. We had the engine started for the first time within a few seconds from cold after merely choking the air intake. Restarting the engine when hot was, perhaps, a little less instantaneous. As one might expect, hand starting on small props, allowing static speeds in excess of 13,000 r.p.m., needed to be performed a little more cautiously if " biting " was to be avoided. The engine was responsive to the compression lever, and the contra-piston moved smoothly and with no tendency to seize when hot. The fine thread compression screw was an excellent fit in the head and there was no tendency for the compression adjustment to slacken off at ultra-high speeds.

The engine was given a brief check period at 8,000 r.p.m. and was then loaded for two hours' running at a speed of 10,000, at the end of which period an increase of just under 500 r.p.m. was evident, equivalent to a power increase of nearly 15 per cent. Some trouble was taken to select the best fuel mixture for the particular engine and of several tried, the blend mentioned previously was found to be slightly superior.

Having now almost reached the end of this report, we are conscious that we have said very little in criticism of the A-M " 10." Therefore, we would mention that the needle-valve is a trifle close to the prop disc, while the engine is, perhaps, heavier than some people consider necessary in a 1 c.c. unit. Yet, against this, we cannot help but point out that the needle-valve, by not being raked back, allows it to be reversed for side or inverted installations, while the weight is by no means excessive and, in any case, is more than compensated by improved performance.

In all, this is a fine little engine and one which, should the trend of future International rules favour a smaller type of competition F/F model, will help to place Great Britain in an extremely good position.

Power/Weight Ratio (as tested): 0.629 b.h.p./lb.

Specific Output (as tested): 118 b.h.p./litre.

Topical Twists

by PYLONIUS

Fly-off

One of the greater social menaces is the lurking ex-modeller. The pest, which abounds in larger number than thermals on a test flight, is invariably encountered when, heavily disguised as a normal human being, you venture out into the everyday world. Quite casually, and without a modelling care in the world, you turn into a shop doorway. Immediately your peace of mind is shattered by some leering ex-modeller's phizog, and the sickening realisation that you are about to be publicly denounced. Creep into the one and nines (all right we'll go up in the four bobs when we've paid for that engine) and a sinister, gloomy figure greets you with the ominous words " Still building model aeroplanes?" He, of course, waits until the lights go up before going into embarrassing detail.

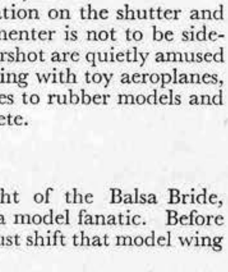
Your reply to his opening gambit is to say weakly, "Just a bit. What about you?"

" Oh," he says crushingly, with a devastating wealth of scorn, " gave *that* up ages ago. Cameras, now."

Vainly you try to keep the conversation on the shutter and focal plane, but your ex-modeller tormenter is not to be side-tracked. Already, the public within earshot are quietly amused at the thought of a mature person playing with toy aeroplanes, and it only needs a few subtle references to rubber models and kits to make your public shame complete.

Marriage a la Mode(1)

I was deeply touched by the plight of the Balsa Bride, who was imprudent enough to marry a model fanatic. Before I express my sympathy more fully I'll just shift that model wing off the armchair so that the wife can sit down.



The Balsa Bride is a relatively new social problem. Not so long ago it could be truthfully said that no model flier ever got married. Any damsel to whom the question was popped would have a " Give up modelling " contract signed and sealed before ever her betrothed unbuckled his knee. This was back in the days when even modellers observed the common decencies of life, and when the wife's mother was more formidably known as the mother-in-law. Sober married life did not permit of the indignity of scampering after model planes; if the sowing of wild oats had to be renounced the trampling of cultivated ones was even more to be deplored. It was inevitably, then, an ex-modeller who took the fateful 2 o'clock walk into a balsa-less future.

There were perhaps one or two anti-social exceptions to the accepted wifely overrule, who tried to fly, model-wise, out of the love nest, but they soon found just how cramped were building operations in the doghouse. But I speak of more spacious times—now young couples would queue up in droves, with key money at the ready, for even the meanest doghouse. This is perhaps the reason why the bride-to-be no longer exacts from her intended a solemn vow never to use a razor blade for any other purpose than shaving—every morning. Even a visit to a model meeting can be a welcome change from a bed-sitter.

The dear girl soon learns her mistake. She wakes on the first blissful Sunday morning just in time to see her unshaven spouse decamping to the flying field. Then, as she surveys the chaos of the domestic scene she realises that she has had her chips—in more ways than one.

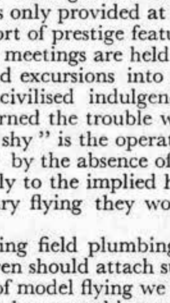
Completely demoralised, the following Sunday she meekly submits to becoming a beast of burden, bowed under a full rally-load of models. Buzzing through the suburbs on the back of a motor-bike at 8 a.m., she leaves a sleepy eyed and puzzled populace to ponder the mystery of a young woman carrying a carton of fluorescent tubes on her back at such an unearthly hour on a Sunday morning.

Fly-past

Every now and then, in a moment of nostalgia, some pre-war modeller picks up a model book, and before he's half-way through the first advert. he's tearing off a scathing diatribe to the Editor on the evils of modern model flying, using the familiar " Those were the Days " theme.

The latest piece of olde tyme glorification to reach these pages comes from a character who recalls with fond and loving memory, the glowing qualities of the J.B.3. Now, you kiddy-winkies too young to remember the golden age of modelling, may be wondering just what miracle of the ever-blue skies was a J.B.3. Well, let old Uncle Pylonius tell you. It was the most fearful monstrosity that ever plagued the model heavens.

Our golden age friend then goes on to ask what kind of modeller is it that can't cut a true $\frac{1}{16}$ strip of balsa by hand. Well, here's his chance to meet Old Shaky Paw, himself, the lad who was buying $\frac{1}{16}$ strip when the J.B.3 was just a blight on the distant horizon. And, as for the kind of modeller who'd fashion balloon wheels from hardwood block, there are, no doubt, institutes where such deeds are perpetrated, but I have so far resisted all well-meaning efforts to make me visit one.



Then there's that bloke on the Corgi whom he mentions. If, in the golden age, someone had gone through the fabulous procedure of whipping out a gas model and sticking it up for a perfect flight all inside 3 min., he would have been hailed as a genius, feted and honoured wherever modellers struggled for a 1 min. duration.

As much as we present day modellers are reviled by our pre-war critic we can look forward to some consolation if he carries out his intended threat of flying a pre-war rubber job on Epsom Downs. Normally, he wouldn't have the ecstatic audience he craves for—even the advanced radio types have to forgo that luxury in these model satiated days—but we'll all be turning out in force for the auspicious event. We're all hot eyed with curiosity to see the mess he makes of that pre-war fuselage when he tries to put a thousand turns on his post-war rubber.

Penny for Your Thoughts

We modellers are apt to be a trifle primitive on our field occasions. What might appear to be a coconut shy to the casual visitor is, in fact, our rally toilet arrangement at its most elaborate. Normally, such luxury is only provided at the more public rallies, and then only as a sort of prestige feature. This is quite understandable since model meetings are held for the benefit of model fliers, whose repeated excursions into the countryside obviate the need for such civilised indulgences.

As far as the fastidious public is concerned the trouble with these coconut shy arrangements is that " shy " is the operative word. The gently nurtured are horrified by the absence of all mod. cons. and do not seem to take kindly to the implied hint that if they were to take up cross-country flying they would enjoy all the wild comforts of model life.

It is pleasing to learn that Dutch flying field plumbing is fit for a duchess. Why our Dutch brethren should attach such importance to this quite irrelevent facet of model flying we are curious to know. We can only suspect it has something to do with the very flat and open nature of the terrain of the apparently not-so-low countries.

THE BRISTOL BULLDOG

G. A. drawings, photos, colour schemes — in fact all the gen to make an exact replica of this famous fighter of the thirties.

WITH the Bristol Type No. 105 and Air Ministry Type No. F11/29, the *Bulldog* was the standard single-seat fighter of the R.A.F. in the early thirties. During its long service it underwent many detail modifications, suffered the addition of numerous appendages in the form of ancillary equipment, etc., but nevertheless retained its excellent handling qualities and manoeuvrability throughout. First put into service as a day fighter, it was adapted for night flying and, later, still further modified in the form of a two-seat trainer, the *Bulldog* (T). In this particular design sweptback wings were used in order to counter the more rearward centre of gravity position. When flown solo the pilot occupied the front seat and ballast was necessary to compensate for the weight of the second occupant. This ballast was stowed under the fuselage in a special frame.

The *Bulldog* (T) employed the same wing panels as the standard *Bulldog*, sweepback being given by the new centre sections to each wing, with the end ribs raked at 3½ deg. Both the fin and rudder area were increased to balance side areas, the rudder shape being quite different from that of the single-seat versions. Essentially the same wing panels, incidentally, were retained through up to the *Bulldog* IV, except that here R.A.F. 35 section was employed on the top wing and R.A.F. 34 section on the bottom wing. The *Bulldog* IV had a different overall appearance since it was fitted with a Bristol Mercury VI engine completely cowled in with a Townend ring incorporating an exhaust collector ring in the leading edge. This particular aircraft was cleaned up aerodynamically all round.

Unfortunately, complete data on the standard *Bulldog* is no longer available, but the accompanying drawings have been prepared largely from existing works drawings, whilst numerous small details can be observed in the various photographs. These photographs, it should be remembered, represent a miscellaneous collection of various types, showing slight detail differences (as, for example, the increased balance area on the skeleton photograph).

The *Bulldog* fuselage was built up from tubular section stock, the basic fuselage being rectangular in section and N braced after of the cockpit position. Wings and undercarriage attached directly to this frame, as detailed in the constructional drawings. Forward, the sheet metal firewall was mounted on the basic fuselage at an angle with the front of the basic fuselage terminating in a mild steel engine mounting plate. To the sides of the basic fuselage were also mounted the twin Vickers guns, firing forwards through troughs in the outer fairing.

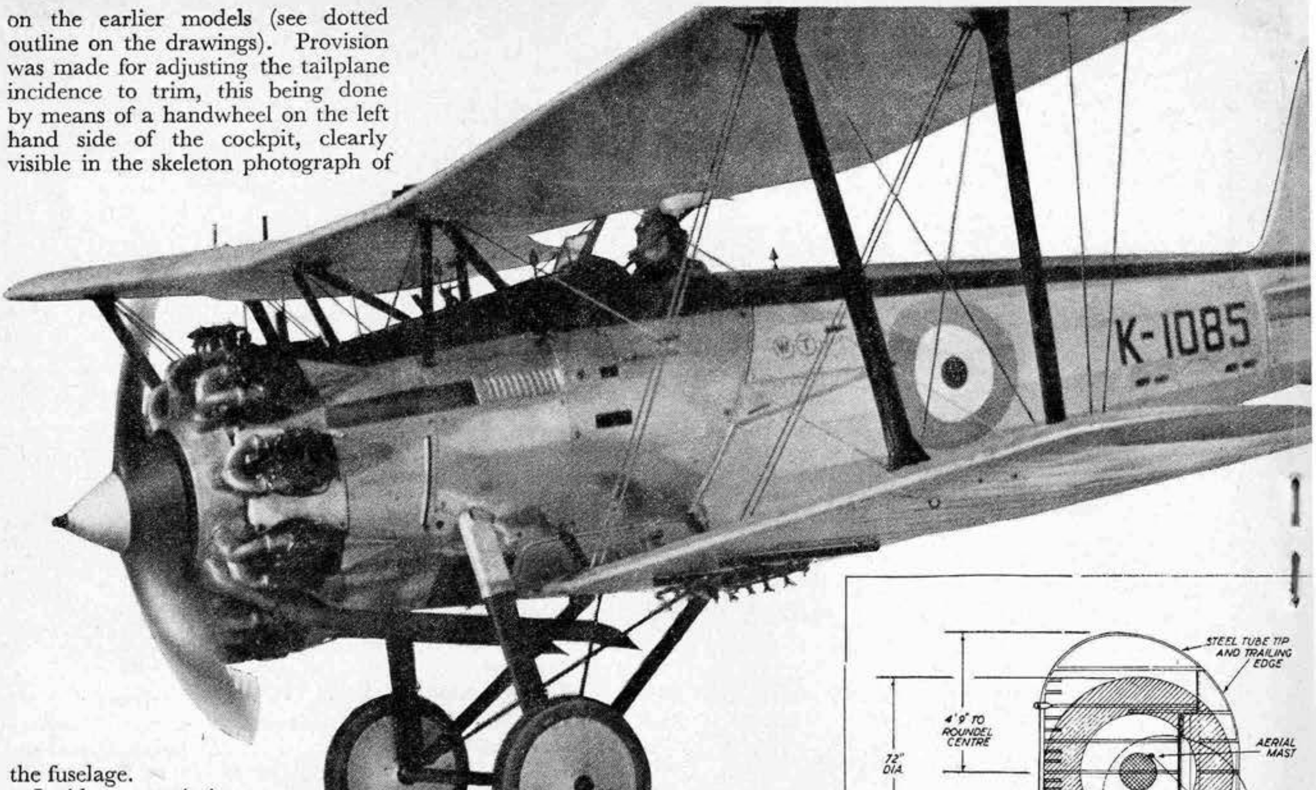
Hoop formers were attached outside the basic fuselage, and fastened directly to the longerons. Their spacing in the rear of the fuselage differed from the main frame uprights. The whole of the front of the fuselage was then sheeted in with detachable metal panels, the rear fuselage shape aft of the cockpit being formed by light stringers running outside the formers which were fabric covered.

The bottom wing centre section was attached to the fuselage by eight struts, forming in effect a W over each tubular main spar. Radius legs from the axle also attached to the rear spar at the same point as the struts. Only the outer struts were visible when the fuselage covering was added.

Both the tailplane and fin were attached directly to the basic fuselage. Fin area was slightly smaller

The Bristol "Bulldog" Mk. IV was powered by the Bristol Mercury VI engine, completely cowled in with a Townend ring, and the complete aircraft was aerodynamically cleaner than previous Mks.

on the earlier models (see dotted outline on the drawings). Provision was made for adjusting the tailplane incidence to trim, this being done by means of a handwheel on the left hand side of the cockpit, clearly visible in the skeleton photograph of the fuselage.

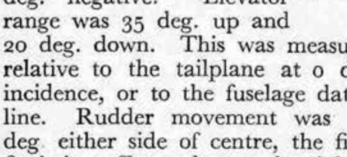


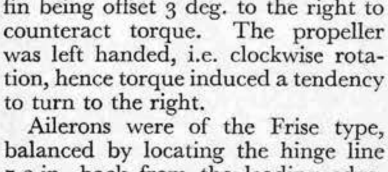
Incidence variation was from 4 deg. positive to $1\frac{3}{4}$ deg. negative. Elevator range was 35 deg. up and 20 deg. down. This was measured relative to the tailplane at 0 deg. incidence, or to the fuselage datum line. Rudder movement was $31\frac{1}{2}$ deg either side of centre, the fixed fin being offset 3 deg. to the right to counteract torque. The propeller was left handed, i.e. clockwise rotation, hence torque induced a tendency to turn to the right.

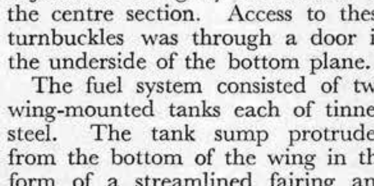
Ailerons were of the Frise type, balanced by locating the hinge line 7.2 in. back from the leading edge. Aileron movement was 25 deg. up or down, i.e. approximately $6\frac{1}{4}$ in. movement at the trailing edge, up or down. They were rigged without droop and operated via streamlined control cables passing down to the lower wing to join a chain around sprockets shielded by guard plates. Connection through the lower wings to the joystick assembly was by cable, adjustment being by turnbuckles in the centre section. Access to these turnbuckles was through a door in the underside of the bottom plane.

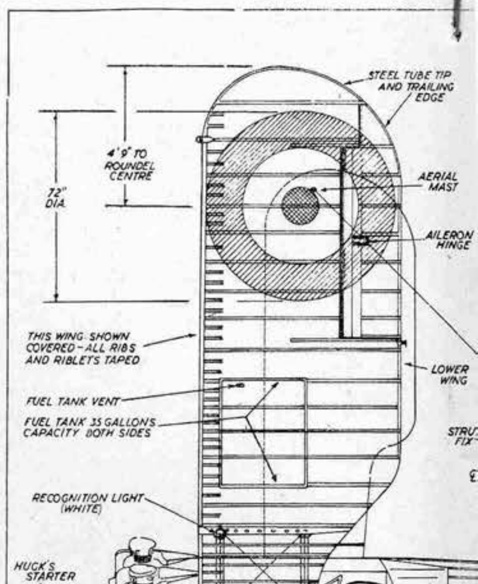
The fuel system consisted of two wing-mounted tanks each of tinned steel. The tank sump protruded from the bottom of the wing in the form of a streamlined fairing and incorporated a magnetic type fuel level indicator, visible from the cockpit. Fuel was gravity fed from these tanks through an external pipe entering the fuselage just by the bottom of the rear centre section struts. The delivery pipes were of steel faired with balsa. The oil tank of $7\frac{1}{2}$ gallons capacity was carried on the top longerons immediately behind the firewall. Working capacity of this tank was $6\frac{1}{2}$ gallons.

The electrical system was 12 volts with a lead-acid accumulator for supply charged by a wind driven generator mounted on the starboard lower wing. Full night flying



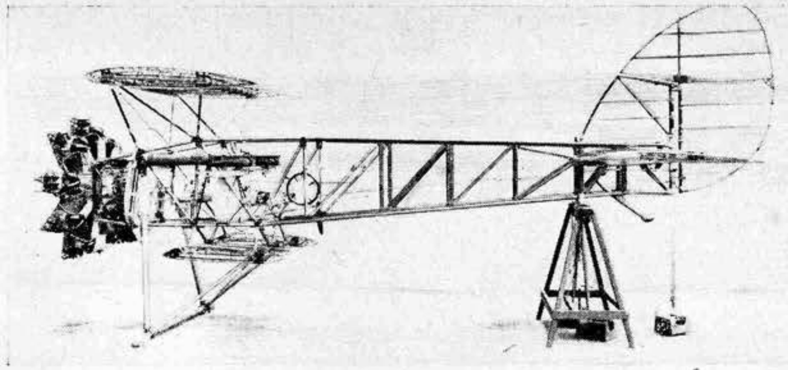






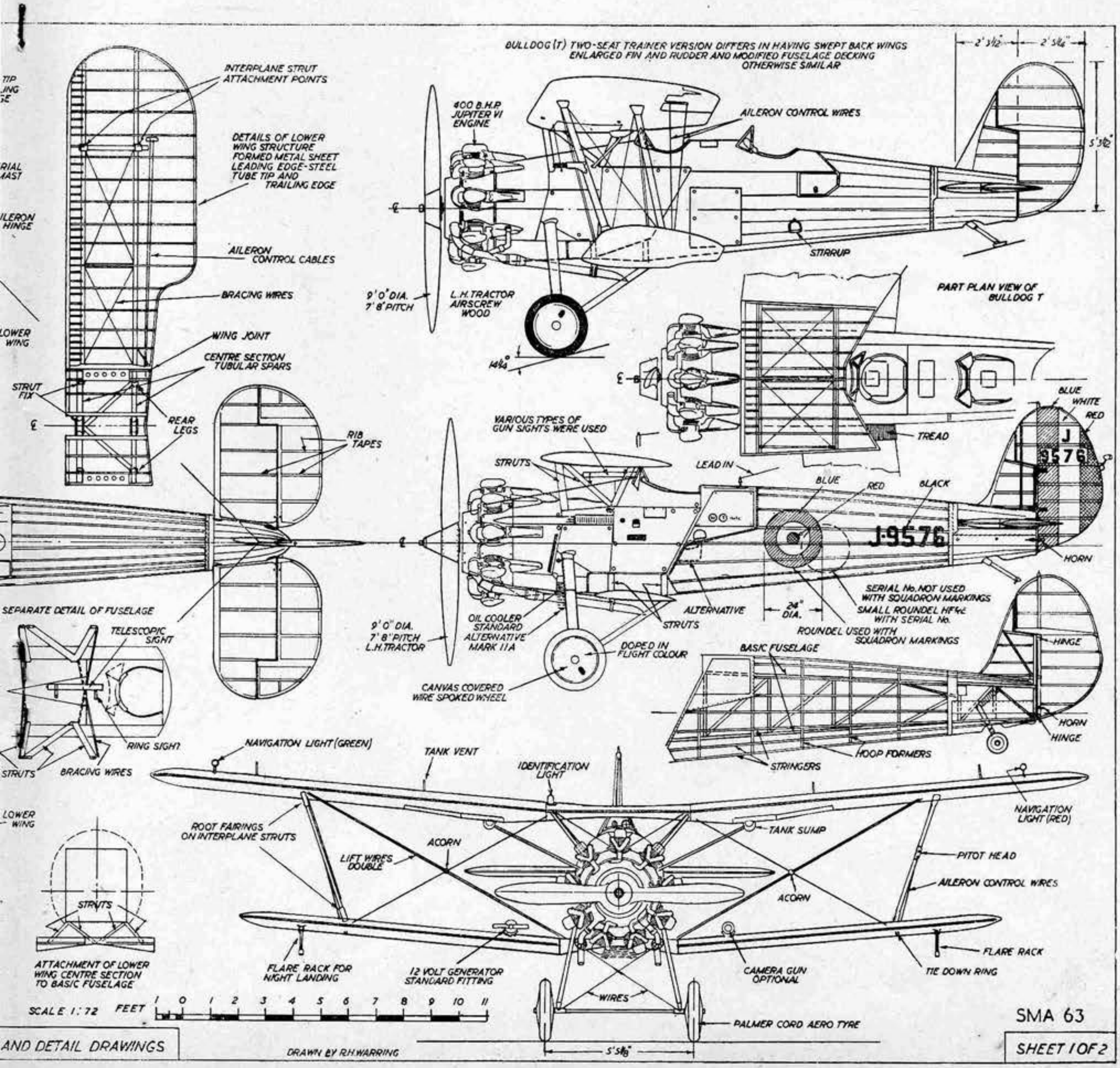
BRISTOL BULLDOG GENERAL ARRANGEMENT AND

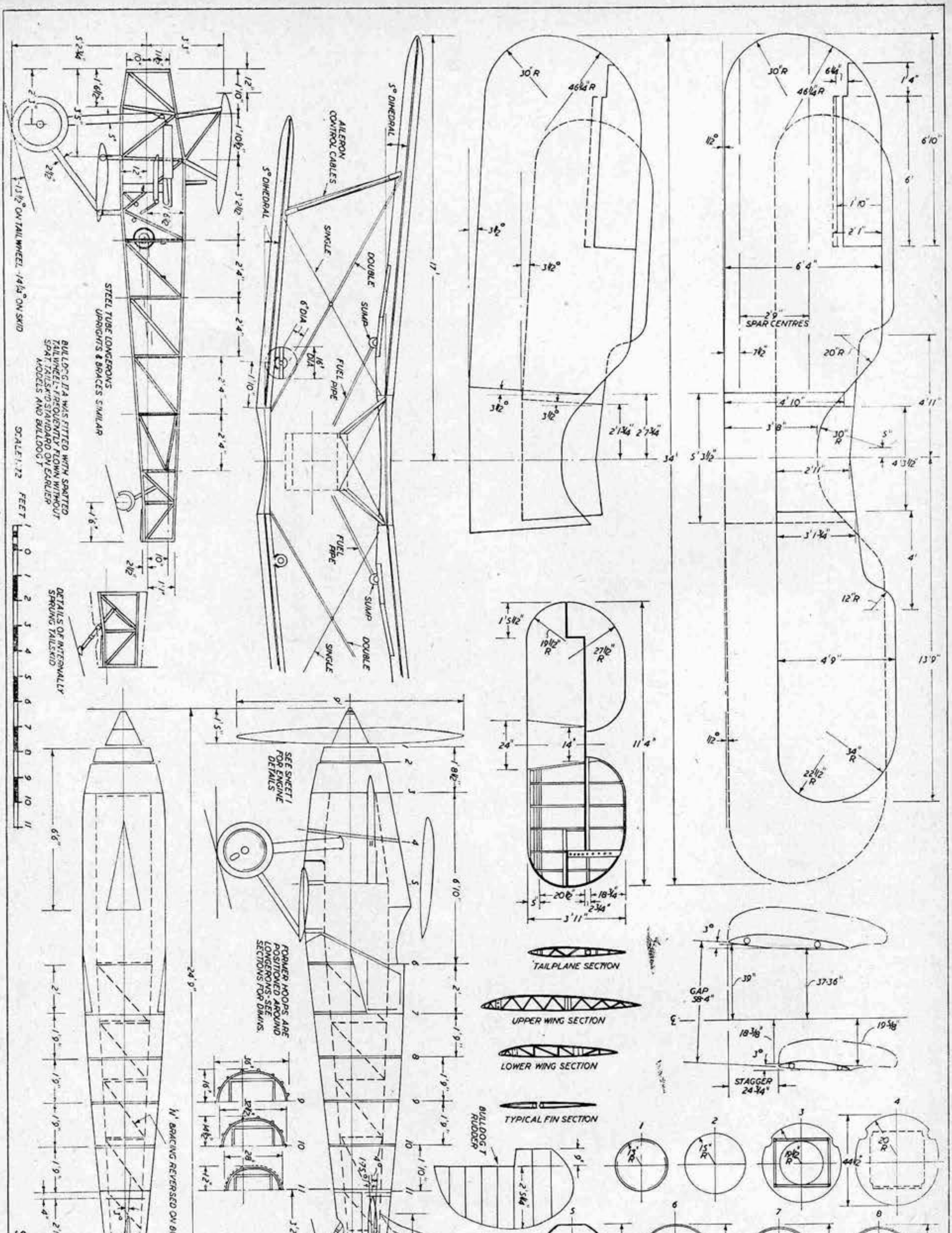
Right: A skeleton fuselage complete with engine, clearly showing the method of construction.



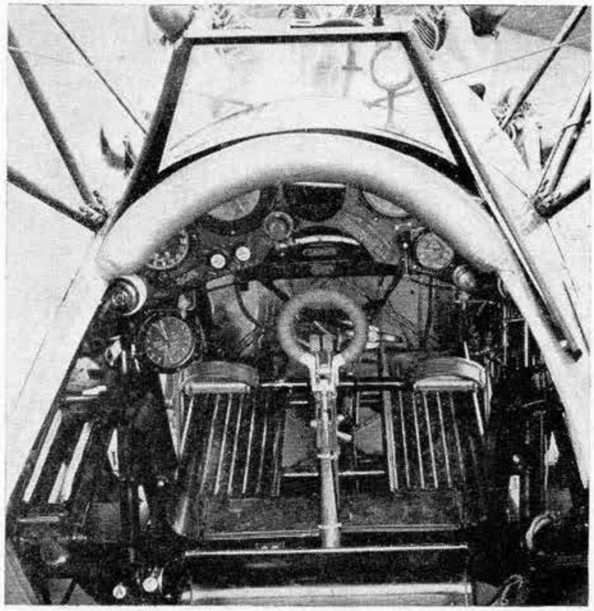
Left: A "Bulldog" Mk.IIA day and night fighter, powered by a Bristol Jupiter engine.

equipment included navigation lights, landing flares and a white signalling lamp on the centre section of the upper wing. Wireless telephone equipment, where fitted, was stowed in a compartment in the fuselage immediately behind the pilot's cockpit. In fact the flying shot on the left shows this clearly marked by the circled letters.





BRISTOL BULLDOG LAYOUT DIMENSIONS ETC.
SHEET 2 OF 2
DRAWN BY R.H. WARRING
SMA 63
STEEL TUBE LONGERONS UPRIGHTS & BRACES SIMILAR
BULLDOG IIA WAS FITTED WITH SPATTED TAILWHEEL - FREQUENTLY FLOWN WITHOUT SPAT. TAILSKID STANDARD ON EARLIER MODELS AND BULLDOG T
SCALE 1:72 FEET
DETAILS OF INTERNALLY SPRUNG TAILSKID
-13½° ON TAILWHEEL -14¼° ON SKID
AILERON CONTROL CABLES
5° DIHEDRAL
SINGLE
DOUBLE
SUMP
FUEL PIPE
6" DIA
16" DIA
SEE SHEET 1 FOR ENGINE DETAILS
FORMER HOOPS ARE POSITIONED AROUND LONGERONS - SEE SECTIONS FOR DIMNS.
'N' BRACING REVERSED ON BOTTOM FRAME
BULLDOG T RUDDER
TAILPLANE SECTION
UPPER WING SECTION
LOWER WING SECTION
TYPICAL FIN SECTION
SPAR CENTRES
GAP 58·4"
STAGGER 24¾"



Top: A three-quarter rear view of the "Bulldog" IIA.

Right: The "Bulldog" "office," which appears sparse by modern standards. Note the five dials and the household-type electric switch.

Below: A "Bulldog" IIA powered by a Bristol Jupiter

Cockpit layout is well detailed in the photograph and so no separate drawings are given. Engine controls were fitted on the left (port) side. The instrument panel itself contained only five dials with a boost gauge mounted below at the left hand side. A "ring" top joystick was standard, and incorporated the two firing buttons for the Vickers in the centre. Rudder control was of the normal foot bar type, adjustable in flight.

BRISTOL BULLDOG (T)

Span 34 ft. (upper wing).
Span lower wing 27 ft. 6 in.
Dihedral (both wings) 5 deg.
Sweepback 3½ deg. (both wings).
Aerofoil section : Bristol Standard Ia.
Areas : top centre plane 24.0 sq. ft.
top wings (pair) excluding ailerons 144.6 sq. ft.
ailerons (pair) 25.8 sq. ft.
bottom centre plane (net) 14.4 sq. ft.
bottom wings (pair) 100 sq. ft.
total wing surface 308.8 sq. ft.
tailplane area (net) 19.0 sq. ft.
elevators (including balance) 34.5 sq. ft.
total horizontal tail surface 34.5 sq. ft.
fin area 4.19 sq. ft.
rudder area 12.46.
total area vertical tail surfaces 16.65 sq. ft.
Overall length 24 ft. 9 in.
Tyre size 750 x 125 mm.

Mark IIa

Span 34 ft. (upper wing).
Span lower wing 27 ft. 6 in.
Dihedral (both wings) 5 deg.
Aerofoil section : Bristol Standard Ia.
Areas : top centre plane 22.5 sq. ft.
top wings (pair) excluding ailerons 144.8 sq. ft.
ailerons (pair) 25.6 sq. ft.
bottom centre plane 13.6 sq. ft.
bottom wings (pair) 100.0 sq. ft.
total wing surface 306.5 sq. ft.
tailplane area (net) 19.0 sq. ft.
elevator area 15.5 sq. ft.
net tail surface area (horizontal) 34.5 sq. ft.
fin area 2.85 sq. ft.
rudder area 11.5 sq. ft.
total area vertical tail surfaces 14.35 sq. ft.
Areas of balance surfaces : ailerons 23.4 per cent., elevators 13.4 per cent., rudder 11.3 per cent. Overall length 24 ft. 9 in. Tyre size 700 x 100 mm.

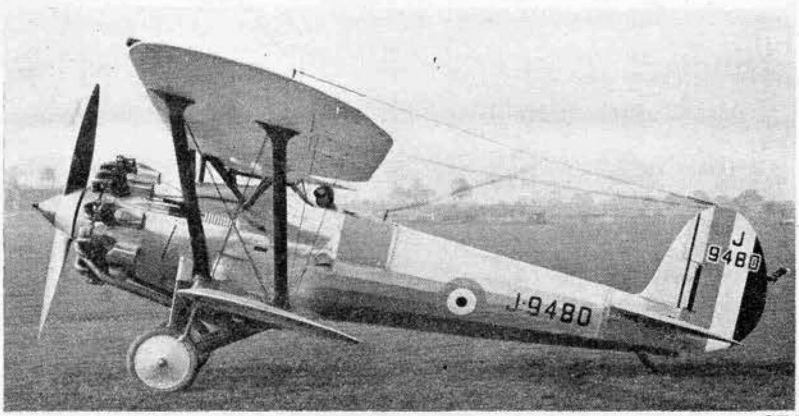
Based on works' drawing data, issued September, 1931.

BRISTOL BULLDOG MARKS

The following versions of the *Bulldog* were built :—

1st prototype Jupiter VII (private venture to F9/26, tested at Martlesham).
2nd prototype Jupiter VII (fitted with experimental enlarged wings for high altitude trials at R.A.E.).
Bulldog II (J.9480) Jupiter VII (winner of F9/26 competition, lengthened fuselage).
Bulldog IIa Jupiter VII—production for R.A.F.
Bulldog II (Latvia)—Gnome Rhone Jupiter VI and Oerlikon gun gear.
Bulldog IIa (Australia)—Jupiter VIF—production for R.A.A.F.
Bulldog IIa (standard)—Jupiter VIIF—sample aircraft for Japan (1) and U.S. Navy (2).
Bulldog IIa (standard)—Jupiter VIIF—production for Sweden and Siam.
Bulldog IIa (Esthonia)—Gnome Rhone Jupiter VI.
Bulldog (Type 105D)—Jupiter VI FH—for Denmark, Madsen guns.
Bulldog IVa (Finland)—Mercury VI S.2.
Bulldog (TM) 2-seater—Jupiter VI—for R.A.F.
Bulldog R.I (G-ABAC)—test bed for Mercury III.
Bulldog R.U. (G-ABBB)—test bed for Aquila.
Bulldog IIIa R.5.—Mercury IV.
Bulldog IVa R.7 (G-ABZW)—Mercury IV—later became *Bulldog* IV with Mercury VI for F.7/30 competition.
Bulldog IVa R.8 (G-ACJN)—Perseus test bed.
Bulldog IIa (K.4189)—experimental model built from stainless steel but not flown.

In addition, two single-seater fighters based on the *Bulldog* were built in Japan in 1930 and two *Bulldog* TMs at the R.A.E. were used as test beds for Cheetah, Rapier and Leonides engines. Excluding the two Japanese fighters, the total of *Bulldogs* built was 456.



Letters

Continued from page 233

of affording real practice in the art of flying. The newcomer, with such a model, would feel that he was really "one of the boys," and the experience gained in building and flying his first aeroplane would be of great value—because it was a *real* model and not a toy.

I don't suppose the trade will even notice the hint, let alone take it. Yet the hobby depends upon a steady flow of beginners for its very existence and so, therefore, does the trade.

Yours faithfully,
London, N.W.3. NORMAN F. WELLS.
(Northern Heights M.F.C.)

. . . and from the Trade

DEAR SIR,—It all depends upon what Mr. Wells means by "beginner." Such a person is usually the younger lad whose main interest lies solely in producing a facsimile of a prototype aircraft seen at his local airport—in a kit form which will give him manipulative experience in handling the tools and materials. When a man builds a model in a competition style for performance, then he is no longer a "beginner" but a "budding aeromodellist."

For Model Aircraft (Bournemouth) Ltd.,
PHIL SMITH, Designer.

DEAR SIR,—Most modellers start their building when 10 to 14 years old—the adult beginner is a much rarer type. For the youngster a small rugged glider is by far the best as it will not be well built, yet must still fly—surely it is the small *scale* models that deter most youngsters? The "older beginner" will firstly have to be talked out of building a R/C *Spitfire*, and then can take his choice from the many admirable rubber and glider kits available—surely the Skyleada *Husky* fits Mr. Wells's bill anyway?

For Contest Kits Ltd.,
M. KING, Director.

DEAR SIR,—There is a tremendous amount of good sense in the letter from Norman Wells, but he has not quite appreciated that there is a definite limit to the price which the beginner seems willing to pay for his first flying model—about 5s.

Unhappily, however, the chief consideration in producing a cheap kit is the economic requirement that demands that as many should be sold as possible in order that they shall be a commercial success, and on these grounds no kit can rival the very small scale model. The fact that these models are extremely difficult to trim and fly does not seem to affect their sales.

There are many excellent designs available in kit form, which would amply fulfil Mr. Wells's requirements, but the size of these models automatically takes them outside the beginner's popular price range.

We all agree that the encouragement of the beginner is vital to the welfare of our movement, and it has always been a matter of the greatest concern that, although many model shops face up to their responsibilities and guide the beginner in the choice of his first kit, many youngsters taking an interest in our hobby for the first time are left to the mercy of some retailers who, having no real knowledge of aeromodelling, take the line of least resistance by selling the youngster a scale model which he is most unlikely to succeed in building and flying.

Mr. Wells is fortunate in belonging to a club which has always encouraged the junior modeller, and it is a pity that more model aircraft clubs do not have an active junior members' section for the encouragement of those boys who cannot get the help they need elsewhere.

For Henry J. Nicholls Ltd.,
H. J. NICHOLLS, Director.

DEAR SIR,—May we draw Mr. Wells's attention to the fact that there are already on the market a number of commercial kits or tough duration models specially designed for the embryo modeller. Skyleada for the past four years have had the 24 in. *Fledgling*, specially designed for beginners, which has proved itself a tough model, very simple to build and easy to fly. More recently they have introduced the 36 in. span *Husky*, which seems to be almost identical with Mr. Wells's specification, even including a finished 14 in. balsa propeller, thus eliminating the beginner's main bugbear, the carving of a successful propeller.

For British Model Aircraft Ltd.
A. E. PINDER, Director.

DEAR SIR,—On perusing Mr. Wells's letter we appreciate his interest in the model aircraft field, especially with regard to kits. As you know, the average club member rather looks down on the idea of making models of kit designs. His remarks are also appreciated regarding the smaller models and various small parts and the difficulties experienced in cutting small bulkheads, coupled with the fact that the average youngster is inclined to "manhandle" some of these parts, not paying particular attention to doping—wing warps, etc., and so upsetting the flight.

Note is being made of his suggestions of easy-to-fly easy-to-build larger models. We already have one model which comes up to the old Wakefield formula—our *Gipsy*, of approximately 40 in. span, which is a simple slab-sider capable of flights up to 5 min. or more provided the model is properly trimmed.

We pass sincere thanks to Mr. Wells for his keen interest.

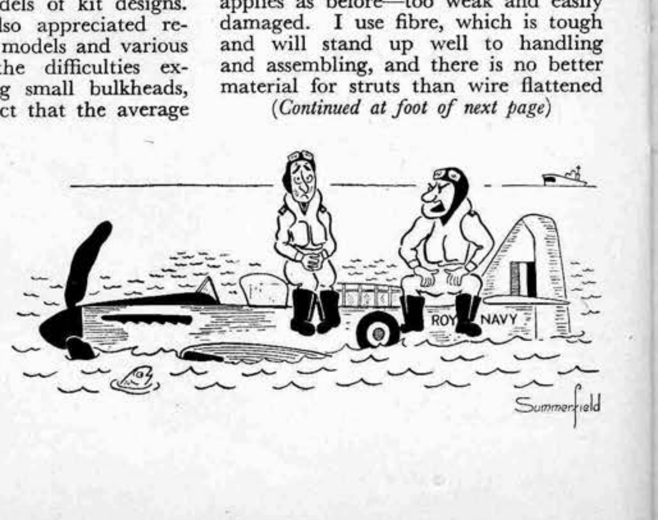
For E. Keil & Co. Ltd.,
E. KEIL, Director.

Solid Critic

DEAR SIR,—I have followed with interest the correspondence and articles dealing with 1/72 solid scale modelling that have appeared in MODEL AIRCRAFT. I agree mainly with most of the criticisms made by D. Stock on P. Gray's article—but, what a surprise I had in D. Stock's own work! The inter-plane struts on the D.H.2 are hopelessly out of line and parallel, also the tail boom struts. This interferes with the whole appearance and "sit" of the machine, and is of far more importance than the odd cockpit detail, and also the entire lack of any sort of wire rigging doesn't help much. I notice also that the models illustrated have not been painted—how on earth Mr. Stock hopes to make a decent job of this is beyond me, now that he already has them assembled. To get anything like a decent paint job the greater part of it has to be done *before* assembly—this is a *must* with scale modelling. More care could also have been taken in keeping the push-rods straight on the radial engine illustrated.

I would also disagree with his construction methods and materials. Having used balsa wood in the past, I discarded this long ago as a most unsatisfactory medium for this type of modelling, being too soft and not strong enough; a harder wood is much more preferable. Personally, I use mahogany for fuselages and I find it ideal. As for wings, I wouldn't dream of using balsa wood, or the cotton and tissue method described, the same applies as before—too weak and easily damaged. I use fibre, which is tough and will stand up well to handling and assembling, and there is no better material for struts than wire flattened

(*Continued at foot of next page*)



"Now if the carrier had been steaming in the opposite direction—that would probably have been a very good landing!"

SUPPLEMENTARY ENGINE REPORT

The BARBINI B.40

THIS Italian engine can be briefly summed up as being a lot better than it looks. Today, the majority of the bigger manufacturers are conscious of the favourable impression given by smoothly finished castings which have been subjected to some after-treatment, by polishing or plating certain fittings and by colour-anodising some alloy parts. In terms of actual performance, the worth of such refinements is nil.

The B.40 is strictly utilitarian in appearance and its square cut lines perhaps give it a slightly vintage air unlikely to excite the attention of the average power model enthusiast. When one has inspected the engine more closely, however, several interesting points are revealed. Whatever the B.40 may lack in outwardly visible charms, it is well made and the internal fits and finishes on our test example were exceptionally good. The main bearing fit was excellent, and the piston and contra-piston fits were among the best we have encountered in a diesel for a long time.

The engine has an unusual cylinder design in which very large transfer ports are used. These are two in number, placed fore and aft, below and between the two exhaust ports, and can be seen in the accompanying photograph. The finned cylinder barrel is a close sliding fit over the upper part of the liner; so well fitting, in fact, that if the small vent hole in the top of the barrel is blocked with the finger, it becomes difficult to withdraw the liner.

The piston is of lightweight design and an unusual feature is the tubular fully-floating gudgeon-pin which is held in position with circlips in the manner of some full-scale i.c. engines. The connecting-rod is equally noteworthy, being of steel with a thin shank but having exceptionally well fitting small- and big-ends of adequate area. The crankshaft, unlike the majority of diesels, has a counterbalanced pattern web.

Type

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

Dimensions

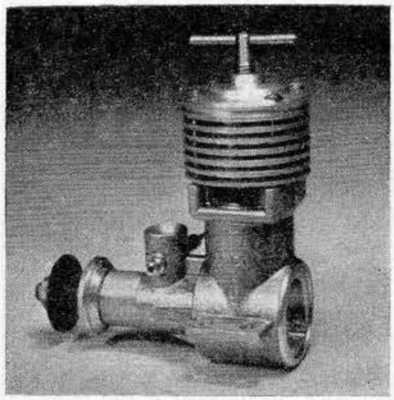
Bore: 14.5 mm. (0.5709 in.). Stroke: 15 mm. (0.5905 in.). Swept Volume: 2.477 c.c. (0.1512 cu. in.). Height to top of cylinder: 2.75 in. Length, rear face of prop to backplate: 2.15 in. Propshaft dia. 5 mm. Weight: 4.3 oz.

General Data

Aluminium alloy diecast crankcase and main bearing housing. Cylinder of special alloy steel, ground and lapped. Piston and contra piston of cast iron. Tubular steel full-floating gudgeon-pin located with circlips in piston bosses. Crankshaft of alloy steel, heat-treated, ground and lapped and running in bronze main bearing bush. Lightweight steel connecting-rod machined from bar stock and heat treated. Cylinder liner located on annular seating and secured by four machine screws through cylinder barrel. Cylinder barrel machined from aluminium alloy bar stock and closely fitted to liner. Spraybar type needle-valve assembly. Beam mounting lugs.

Performance

On test we found the B.40 pleasant to handle and well up to the performance



expected of an engine of this type. The motor started easily and, without reference to the maker's leaflet and "guesstimating" the required needle setting, we had the engine running in less than 20 seconds. Starting was obtained by choking the intake only, no priming through the ports being required. Fuel used was a castor-base mixture consisting of 40 per cent. ether, 30 per cent. paraffin, 28 per cent. castor oil and 2 per cent. amyl-nitrate.

The engine was tested on various props producing speeds of between 7,500 and 12,000 r.p.m. The maximum output of this engine is obtained in the region of 12,000/12,500 r.p.m., where 0.22/0.23 b.h.p. is realised. The best propeller sizes for competition free-flight and C/L work would appear to be 9×4, 9×5 (F/F) and 8×8 (C/L) and speeds ranging from 9,000 to 11,000 r.p.m. were obtained with various examples of these sizes.

The engine ran consistently at all times and without any appreciable tendency towards power loss with warming up. The compression adjustment remained pleasantly smooth irrespective of engine temperature and, due to the excellent fit of the contra-piston, there was neither leakage of oil into the cylinder head, nor any tendency for the contra-piston to seize when hot.

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by beating it with a hammer and filing to correct shape and length.

Details *are* important, as D. Stock says, but I would say that correct sit and appearance are of much greater importance as they can be spotted immediately if not correct. Also on details I would advocate stronger methods than those recommended in the article—more use of solder (not the liquid stuff), wire and sheet brass, etc. One word of warning to prospective scale modellers. If you want models to be 100 per cent. correct, find all the "gen" you can on the subject you choose, and if possible verify it, and then double check it—one can save hours of useless work by doing this.

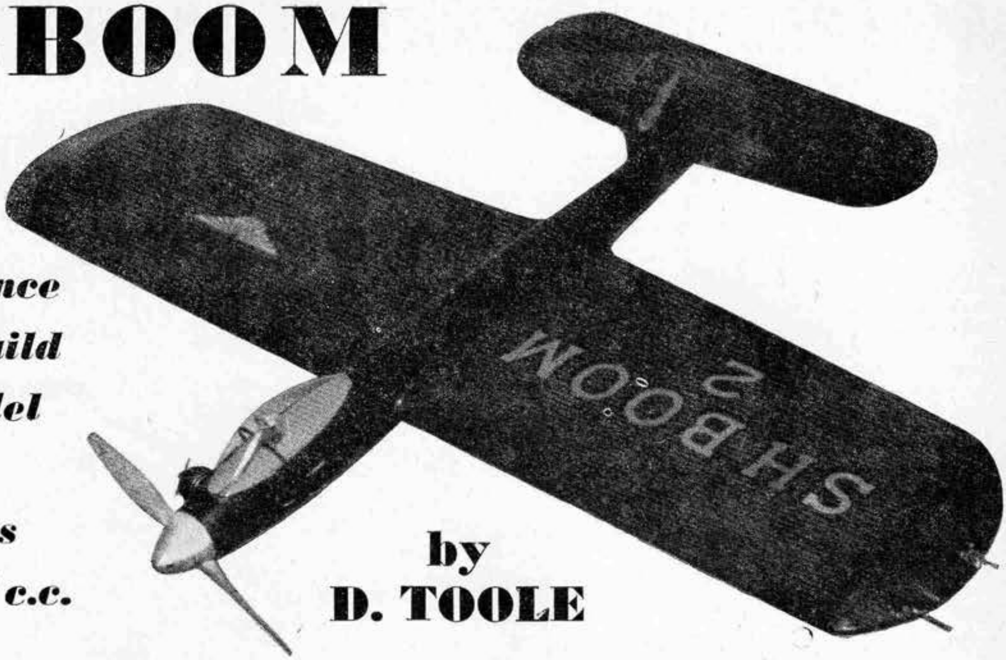
Yours faithfully,

Edgware, Middx. G. HADDOW.

A nicely detailed R.E.8 built by reader G. Haddow.

SH-BOOM

A high performance easy to build stunt model designed for motors of 2·5-3·5 c.c.



by D. TOOLE

THE modern stunt model is far removed from the early " Box Car " designs, and with *Sh-Boom* the designer has presented an easy to build, good looking stunt model, that lives up to the traditions for performance established by the West Essex Club, of which D. Toole is a member.

Fuselage

Shape the sides from $\frac{1}{4}$ in. sheet and cut out the section for the wing; then cut out the formers. Take the engine bearers and cement them to F2 and F3 which are of $\frac{1}{8}$ in. ply. When dry, cement to one fuselage side, install fuel tank, and slide the wing into position. Next cement F2 and F3 onto the other fuselage side and after cutting out the tank vent holes add F4A, F4B, F5 and F6. Now cement the wing into position. Add upper and lower $\frac{1}{4}$ in. sheet to the fuselage and leave to dry, then carve and sand to the correct section.

The cowling is constructed from scrap sheet and block, carved away to suit the engine used and faired into a $1\frac{3}{4}$ in. spinner (after engine is installed).

Wing

Start by cutting out 12 ribs from 3/32 in. sheet and two from $\frac{1}{8}$ in. sheet. Next pin to the plan the ready shaped L.E. and T.E., also the lower $\frac{1}{4}$ in. $\times$ $\frac{1}{4}$ in. spar. Add ribs and top spar, also $\frac{1}{8}$ in. sheet tips. Next install the bellcrank complete with lead-outs and push rod and cover the centre section with $\frac{1}{16}$ in. balsa.

Tailplane and Fin

These are constructed from fairly hard $\frac{1}{8}$ in. sheet. Sand to section and add elevator hinges and horn to tailplane, then connect the horn to push rod and cement tailplane to fuselage. Cement fin to top of fuselage and add the $\frac{1}{16}$ in. wing trailing edge fairings.

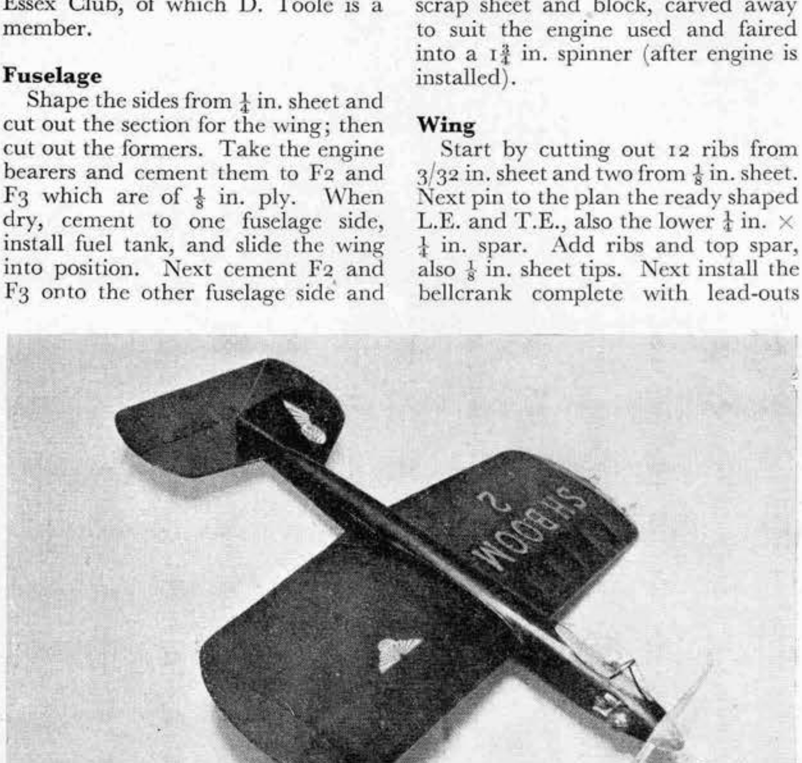
Finishing and Covering

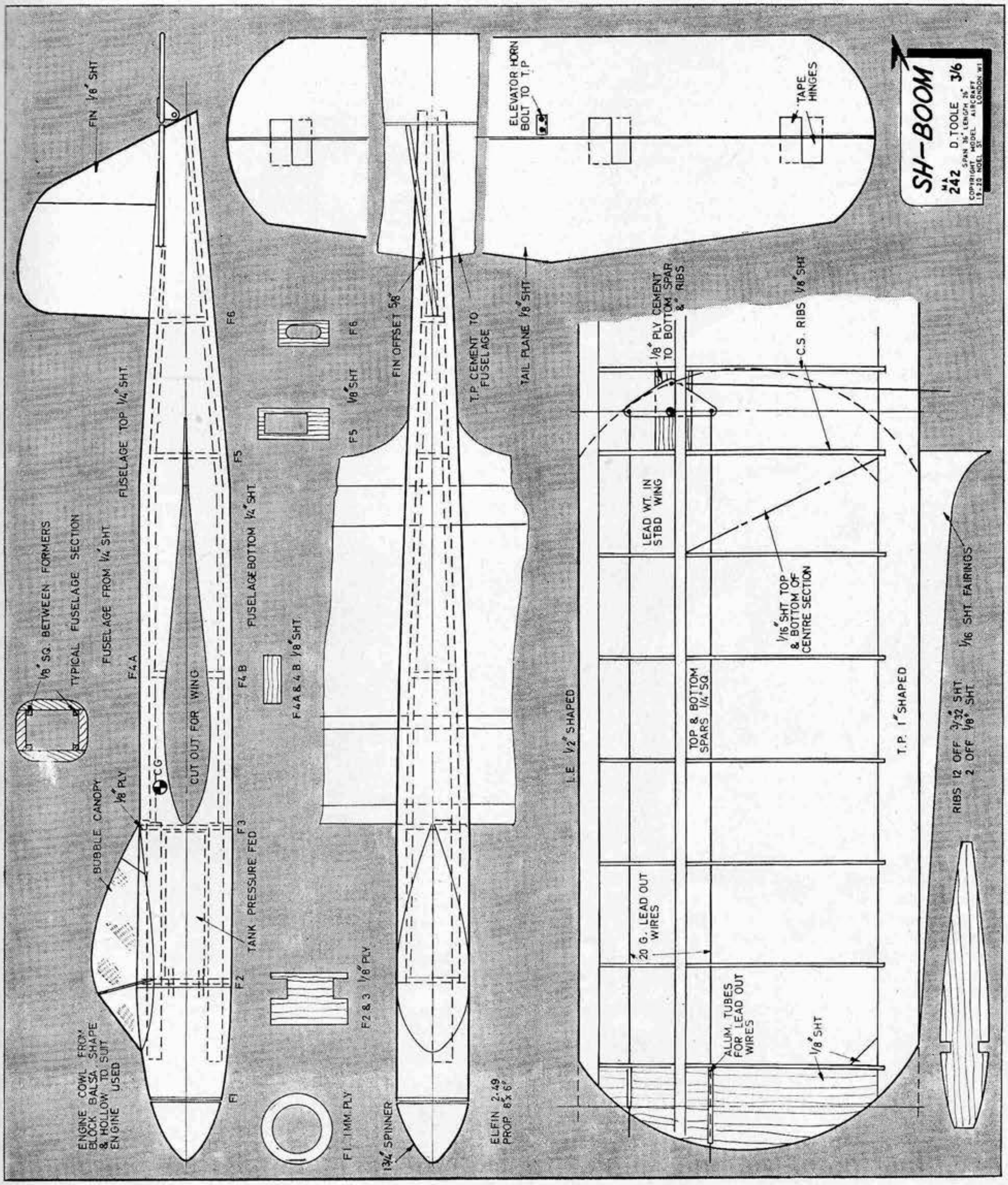
Sand the whole model with fine sandpaper. Cover the fuselage and fin with lightweight Modelspan, giving them one or two coats of clear dope. Then sand lightly and add one or two coats of colour dope. When dry, cement the cockpit cover in place. The wings are covered with heavyweight Modelspan and given two or three coats of glider dope. Finally colour as required.

Although no U/C is shown on the plan, one can be fitted for competitions either by fixing to the engine bearers or by installing an U/C box between F3 and the L.E. of the wing, raking the wheels forward to about 3 in. in front of the C.G.

Flying

Lines between 55 and 60 ft. can be used according to the engine; the best props being either 8 in. $\times$ 6 in. for 2.5 c.c. or 9 in. $\times$ 6 in. for 3.5 c.c. The model is very smooth to fly due to the long nose.





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Criterium d'Europe

THE seventh in this popular series of annual events was this year held at Etterbeek near Brussels, on the police and cavalry training ground, with its excellent surface made up from a resilient material salvaged from an airfield runway. As usual, the general organisation was excellent, there being a permanent raised and covered control room, with adequate arrangements for spectators and competitors, while meals were provided by an adjacent hotel. The whole area was screened with safety nets about 10 ft. high.

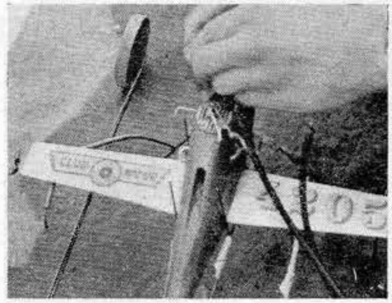
A full "private enterprise" team represented Great Britain, with Howard, Rhodes (Foresters), and Edmunds (High Wycombe) entered in team race; Gibbs (E. London) speed; and Templeman (Sidcup), combat. Thompson (Foresters) was

Speed winner Battlo of Spain (right) prepares one of his models for a contest flight.

the non-competing mechanic and D. A. Gordon, team manager.

Gibbs returned 196 k.p.h. for his first speed flight, and when this was followed by 195 k.p.h. from Battlo of Spain, it was obvious that a most thrilling contest was going to ensue. On his second flight Gibbs increased his speed to 200 k.p.h., while Battlo returned 204 k.p.h. It appeared, however, to those watching that in addition to flying low he was also whipping. When Gibbs tried the same tactics for his last flight of 204 k.p.h., Spain protested and following a counter protest about Battlo's flying, it was agreed to have a re-run. This resulted in a win for Battlo, who was now flying a different model, his first having left the lines and tested the efficiency of the safety barrier. Both of Battlo's models were powered by Super Tigres which had, however, been modified. No other entrant could approach the speed of the top two men the nearest being over 25 k.p.h. slower.

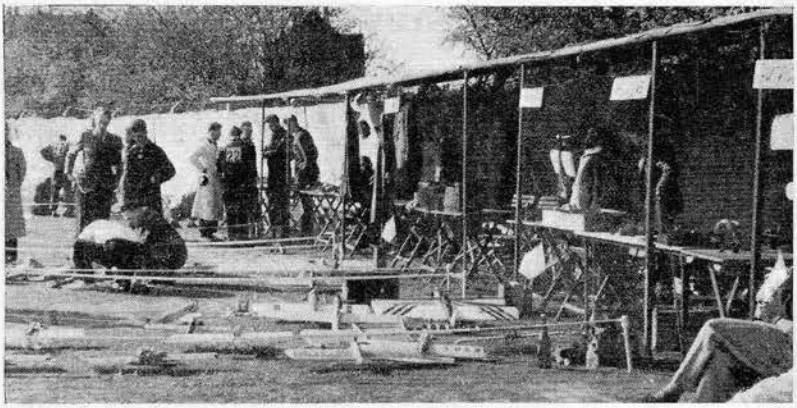
Following a mix up in the second team race heat, Great Britain protested most strongly about excessive whipping, and after this the flying



Deville of Belgium about to start his speed model—note the interesting dolly.

was much cleaner. An unlucky prop breakage in a really thrilling final lost us the race by only 2 sec.; in fact there was only 9 sec. between the first and last men.

Templeman and Howard were the only members to fly combat, but in spite of some consistent flying, particularly by Templeman, were unplaced. Garcia of Spain was finally declared the winner after a final bout with Rieger of Germany.



Above. The pits, with a fine array of Belgian stunt models, while in the background the British boys have a conference. Below : The British Team, left-right : Edmunds, Gordon, Rhodes, Gibbs, Howard, Templeman and Thompson.

RESULTS

Speed 2.5 c.c.

		k.p.h.	
1. Battlo (Spain) ...	195	—	202
2. Gibbs (Great Britain) ...	196	200	197
3. Jarry-Desloges (France) ...	169	172	163

Team Racing

1. Smelt (Holland) ...	5:45
2. Howard (Great Britain)	5 : 47
3. Edmunds " "	5 : 50
4. Van De Dyk (Holland) ...	6 : 4

Combat

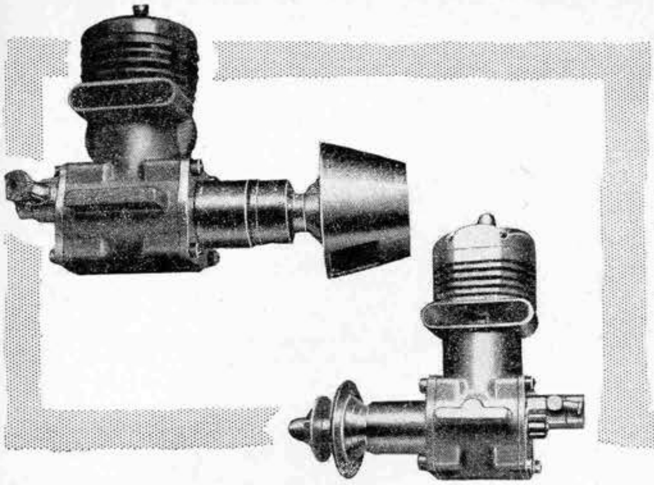
1. Garcia (Spain)

Stunt

		Points	
1. Lecomte (Belgium)	835	884	913
2. Rieger (Germany)	870	800	874
3. Matthey, A. (Switzerland) ...	555	615	865

Team Award for the Grand Prix Du Criterium D'Europe

1. Spain	5 points
2. Germany ...	9 points
Belgium	9 points
4. France	11 points



Motor Miscellany

BY

PETER CHINN

READERS of the Engine Test report, in last month's issue, on the Hungarian Aquila Baby engine will recall that this motor had the highly unusual feature of an aluminium alloy contra-piston. It may also be remembered that this was troublesome in that it quickly seized within the cylinder due to the expansion differential of the aluminium contra-piston and the cast-iron cylinder liner.

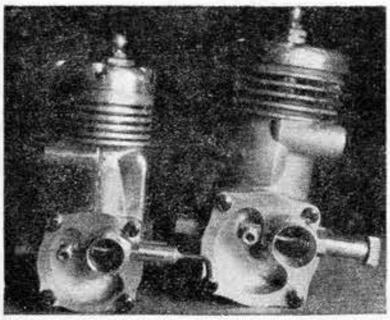
It is, of course, our normal practice to communicate to the manufacturers details of any faults or unusual occurrences that may arise during the course of tests and we have now received a letter from the Hungarian exporters in which they comment as follows:—

" As to the question of the contra-piston made of aluminium alloy, we have been told by the designers that this type of contra-piston has the following advantages:—

" (1) It makes the production much cheaper,

" (2) It is much lighter in weight than a counter piston made of cast-iron,

" (3) If the counter piston has been once adjusted, a readjustment is not necessary any more, not even when building it into another fuselage. For an advanced modeller, it is not necessary to control the engine by adjusting the contra-piston; he may use the needle-valve for this purpose."



Another view of the Carter 2.5 and 5 c.c. engines (these are also the subject of our heading photo this month). Note the extremely large intakes and the central plug location of the larger model.

The first two claims are obvious and need no further comment, but the suggestion that the " advanced modeller " does not need to use the compression lever is an interesting one.

It is perfectly true that, once the compression lever has been set for a given performance, it is possible, *with some engines*, to ignore the compression lever thereafter and to re-start the engine with the compression fixed. Many early diesels, of course, had fixed compression (i.e. no contra-piston) and some experienced modellers, using an engine continuously and frequently in one model, get into the habit of leaving the compression set, once the critical setting has been established.

This is in order, as far as it goes, and we did find that the Aquila Baby would, in fact, start and run satisfactorily on fixed compression settings, within certain r.p.m. ranges However, one certainly could not follow such a procedure with many of the model diesels currently on the market.

The adjustable contra-piston of the modern model diesel really has two separate functions.

Firstly, it is the means by which the ignition timing of the engine is adjusted initially to the load and by which small differences in the characteristics of different fuels can be compensated. Therefore, any change in the load (i.e. propeller dimensions), allowing r.p.m. to rise or fall, needs a compensating adjustment to the compression. This adjustment cannot be substituted by a mere variation in mixture strength (i.e. readjusting the needle-valve). Enriching the mixture via the needle-valve may restore even running if the load has been reduced, but this will almost certainly mean that the engine is not developing its best performance.

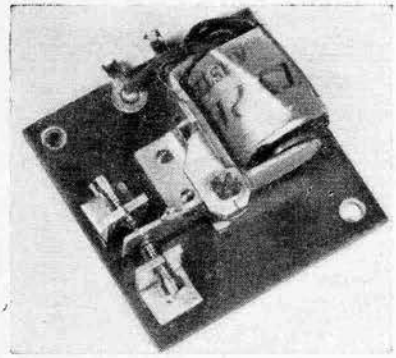
Secondly, as the self-ignition point of the mixture is advanced by the combustion chamber warming up, the contra-piston also enables us to balance this pre-ignition tendency by reducing compression back to the correct timing point. If, therefore, the contra-piston should, by this time, be seized in the bore, its usefulness in this respect is eliminated. It then becomes necessary to first determine, by trial and error, the best compression lever setting for *maximum performance with the engine thoroughly warmed up* and to then persuade the engine to start and warm up (possibly assisted by using a richer mixture) on this fixed setting.

The new, improved model Elfin 249 BR which will appear in the M.A. Engine Tests shortly.

As we have said, such a procedure is possible on some engines. It is not, however, an alternative that can be generally recommended and we do not feel that the majority of power model enthusiasts would take kindly to it.

These remarks, arising out of our tests of the Aquila Baby, prompt us to mention another Hungarian engine which we have just received from Budapest. This is the 2.5 c.c. Proton SM-03 diesel. The work of a Mr. Ferenc Somogyi, the engines, we are advised, are produced by the Metal & Iron Co-operative of Szeged.

The Proton is of the common, shaft-valve, radial port set-up and utilises Arden-type cylinder porting. The engine reaches something of an extreme in short-stroke design, however, which, it seems to us, is not a particularly happy arrangement with the port layout used, involving, as it does, a somewhat over-generous exhaust period of close on 180 deg., while the intake system is in most respects of quite modest proportions. On the other hand, the extremely small interior dimensions of the crankcase, combined with a piston which is made almost solid by the use of a substantial alloy insert containing the gudgeon-pin bosses, must result in quite exceptional crankcase compression and we shall therefore reserve judgment until we have had the engine on test.



The revised Typhoon 5,000-ohm relay for R/C is more compact than the original type. It has silver contacts.

A recent addition to the American market is the Veco 19 " Series 100 " glowplug motor. This, of course, is of a type at which American designers of quantity-built model engines excel and the Veco is no exception. The motor is of the loop scavenged, shaft rotary valve type, with a bushed main bearing and lapped piston. It has the virtually " square " bore and stroke of 0.634 in. × 0.633 in., giving a swept volume of 0.1998 cu. in. or 3.274 c.c.

Unlike previous Veco models, the new 19 features a one-piece pressure diecast crankcase, which combines both the main bearing housing and the cylinder barrel, as well as such incidentals as carburettor intake and exhaust duct. An inserted iron cylinder liner is used which is an excellent fit in the casting and is flanged at the top. The cylinder head has a circular channel to fit over this flange and the asbestos composition head gasket used is thus closely confined and unlikely to give trouble. Six head screws are employed.

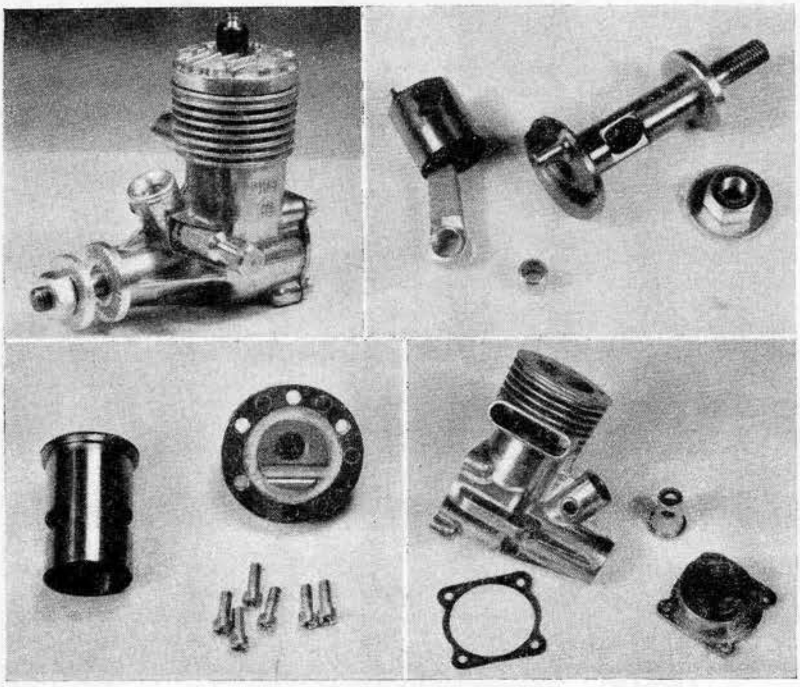
The piston is of lightweight design with the lower part of the skirt smaller in diameter to reduce piston friction. A machined dural connecting-rod is featured, together with a floating big-end bush of the same material. Both big-end and small-end bearings are beautifully fitted. The crankshaft, of typical American design, using an ample journal and large gas passage, has a crescent counterweight machined in to partly balance reciprocating, as well as rotating, weight. The journal is 1¼ in. long and of 13/32 in. dia. It permits a gas passage of some 9/32 in. bore.

Induction timing is fairly generous, with a full 180-deg. intake period, the valve opening 45 deg. after b.d.c. The avoidance of an unduly large and weakening crankshaft port is effected by using a fairly large diameter intake in the main bearing. The carburettor body is of $\frac{5}{16}$ in. bore at the jet, opening out to 13/32 in. at the entry. A venturi insert is, however, fitted, reducing the choke diameter to just under ¼ in. for normal (i.e. other than racing) purposes. A brass spraybar type needle-valve is fitted as standard.

An unusual feature (but one which has previously been seen on certain earlier designs such as the original Atwood designed Torpedo) is the positioning of the ignition plug to the exhaust side. Normally, of course, if a plug is not placed centrally in the head, it is offset towards the transfer side and this has tended to become accepted as the obvious course, although, in fact, the ideal plug location is purely dependent on the shape of the combustion chamber and its effects on flame travel and scavenging characteristics.

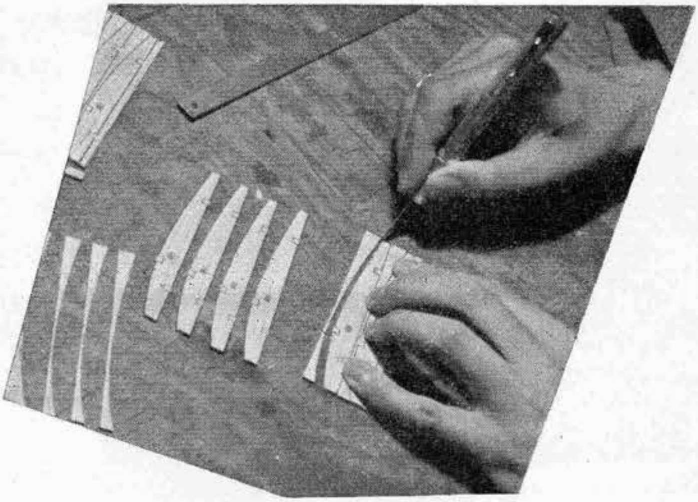
A feature of the 19 and other recent Veco engines is " T.C.C.," or

(*Continued on page* 265)



The new American Veco 19 engine which features large gas passages and very rigid construction. Note the large main casting embodying crancase, cylinder barrel and main bearing housing, also the recessed head gasket, floating big-end bush, large diameter crankshaft journal and plug offset to the exhaust side.

Building the wings and tail



The NEW M.A. BEGINNERS' COURSE PART V

ONE of the essentials of a beginner's model is a robust and easily constructed wing and tail unit design. Another is that the wing and tail are built accurately. A model will never perform satisfactorily with warped flying surfaces. Therefore, having chosen a model design with a simple but strong framework, every effort should be made to assemble it carefully and accurately.

It would be a mistake to suggest that any one part of a model aeroplane requires less care and attention than another, but one of the reasons for beginning your first model with the fuselage is that it gives you the initial experience in simple assembly procedure which is of especial value when constructing the wing and tail. The fuselage must be as well built as you can possibly make it, as it is the component to which all the other parts of the model are attached. Having done this, redouble your efforts to make a good job of the flying surfaces.

As with the previous chapter on fuselage construction, the photograph sequence is based mainly on the Jasco *Tutor* beginner's glider which is of 30 in. wing span.

The first thing to do is to prepare the wing ribs. When building from a kit, the ribs will be supplied in one of three forms. Firstly, they may be printed on sheets of balsa wood, thus requiring to be cut out with a razor blade or modelling knife. Alternatively, instead of being printed, the sheets may be die-cut, requiring only that the ribs be pressed out (although possibly requiring to be released, here and there, by application of the model knife) or, thirdly, the ribs may be supplied ready made and finished.

One of the first requirements of accurate wing construction is that all ribs should be absolutely identical. This does not merely apply to the outline shape. Just as important, if not more so, is that they are all exactly the same length (assuming the wing to be of the parallel chord type) and that the positions of the spar slots are the same on all ribs.

In some kits having printed or diecut stock, the ribs are positioned exactly one above the other on the sheets. In this case, you can make sure that the lengths of the

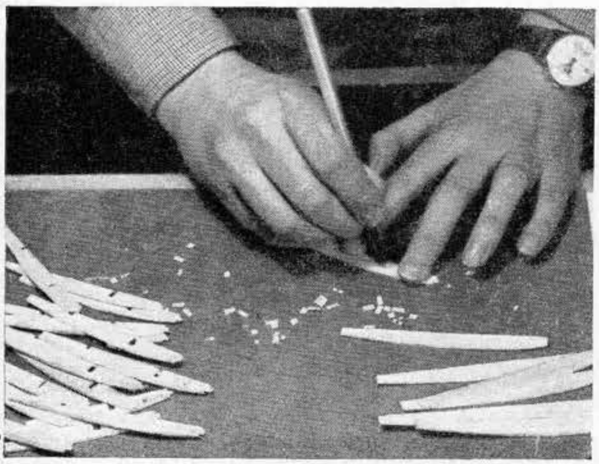


Fig. 1. Using a chisel-point knife for cutting spar slots in ribs.

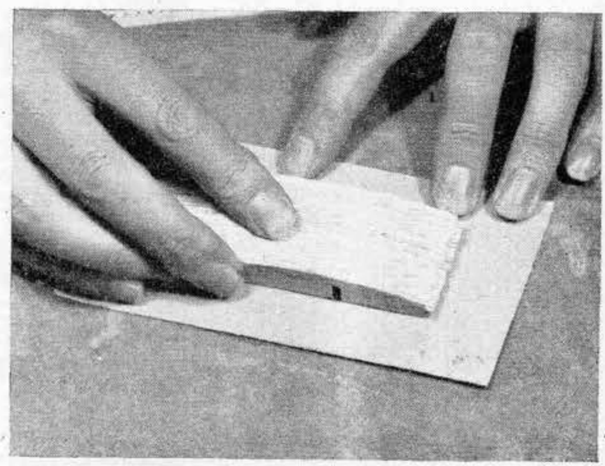


Fig. 2. Smoothing down a block of ribs on a sheet of sandpaper.

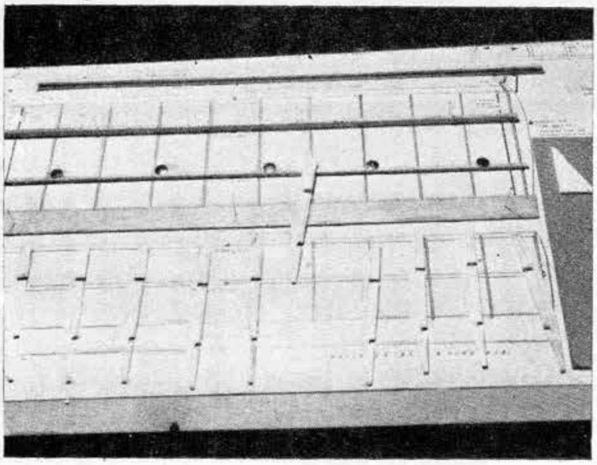


Fig. 3. Laying out the spars on the plan, ready to receive the ribs.

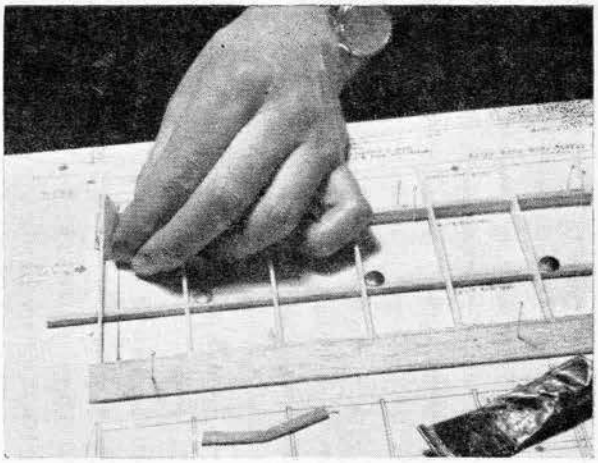


Fig. 4. Using a sheet balsa template to align the centre section rib.

ribs are identical by slicing straight across the sheets against the grain, with the aid of a straight-edge. Use the straight-edge, too, when cutting the flat bottom surface although the cambered top must be cut free-hand.

Spar slots on printed wood can be cut in two ways. If you are satisfied that they are marked accurately, they can be cut individually as in Fig. 1. Here it is useful to have a chisel-point blade in your knife, such as the "X-acto" No. 17 blade.

Alternatively, all the ribs can be pinned together in a block and the spar slots made by cutting them *en masse*, preferably with a razor saw. In any case, it is a good idea to pin the ribs together for final shaping (especially if the die-cutting is not very clean) so that they can be smoothed down on a level surface (see Fig. 2). Where ribs are supplied ready finished, this is not, of course, necessary.

As in the case of the fuselage, the drawing is pinned or taped down to your building board. Incidentally, make sure that the drawing is pulled out flat in order to avoid any wrinkles or ridges that would prevent the framework from lying perfectly flat. The same applies to the waxed paper covering if you should use this method of protecting the plan instead of rubbing with candle wax or soap. It is usual, with most models, to build the wing in two halves, which are then joined at the centre section after assembly.

Position the centre spars on the plan with pins either side of the wood and check the fit of the ribs on them. The slots should be a close but easy fit. (If the fit of the ribs is excessively tight—especially if the spar is a deep one—there is a danger of the ribs being bowed upward when removed from the plan. Alternatively, if the slots are too big there is a danger of the cement causing the gap to shrink so that the ribs will tend to be bowed downward. Do not omit to check, also, the fit of the leading edge spar against the nose of the ribs.

With some wing designs, the ribs are let into slots in the trailing edge spars. If this should be the case, the trailing edge should first be marked and slotted (a small file is useful here, although a steel backed razor blade can be used) and then pinned in position on the plan. Incidentally, it is quite permissible to pin *through* the wood in the case of trailing edge stock as it is wide and will not split easily (Fig. 3).

The next step is to position the ribs on the spars as indicated on the drawing. Pre-cement them and then cement each in position securely, making sure that it is upright and that it is well pressed down so as to make contact, all along its bottom edge, with the building board.

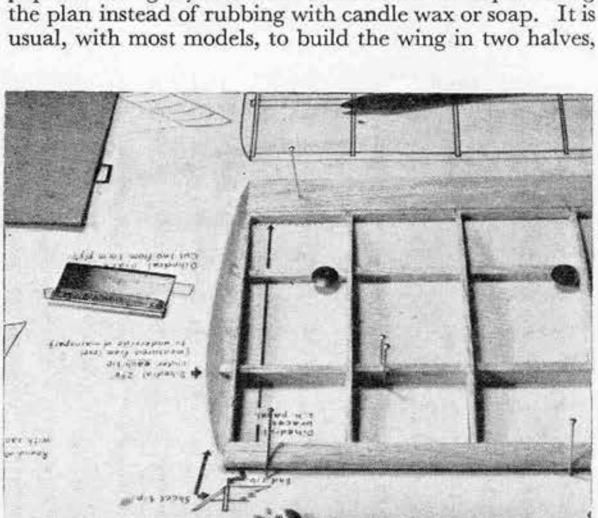


Fig. 5. After fitting the leading-edge spar, the wing-tip is fitted.

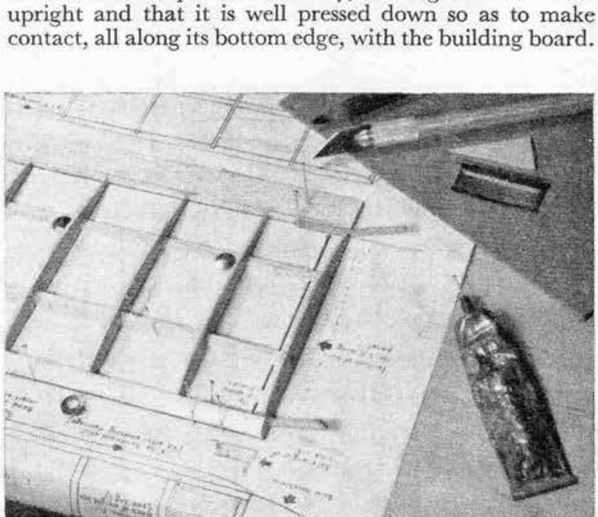


Fig. 6. Fitting the dihedral keepers which join the wings.

Usually, root or centre section ribs are inclined slightly so as to be vertical when the wing panels are raised to the correct dihedral angle. Therefore, it is a good idea to make a simple sheet balsa template against which the rib can be tilted to give the correct slope, as in Fig. 4.

When all the ribs are in position, the leading edge spar may be fitted. Many kits nowadays contain ready shaped leading edges. In others a square (usually set on edge) or oblong section spar is used. In the latter event, the strip may be roughly rounded off before fitting, but it is more usual to leave this until the wing is completed and has been removed from the plan, when the leading edge can be carefully shaped up with a sanding block as in Fig. 9 (Mercury *Magpie* model).

Wing tip construction is in various forms and the inclined sheet balsa type tip as shown is only one of many. In general, however, this blunt type of wing tip is more widely favoured, especially for elementary models, due to its greater strength and simplicity. The sheet tip should be finally shaped up with a sanding block after fitting.

Some means of connecting the two wing halves together and at the correct dihedral angle is, of course, necessary. On some small models, the two panels are merely butt jointed at the centre with plenty of cement. Usually, however, it is necessary, in the interests of strength and accuracy, to connect them by means of dihedral braces or "keepers," which are shallow V-shaped plates of plywood (sometimes balsa on light models). These go through the centre ribs and are cemented against the spars. Fig. 6 shows how these are attached to one panel of the *Tutor* wing.

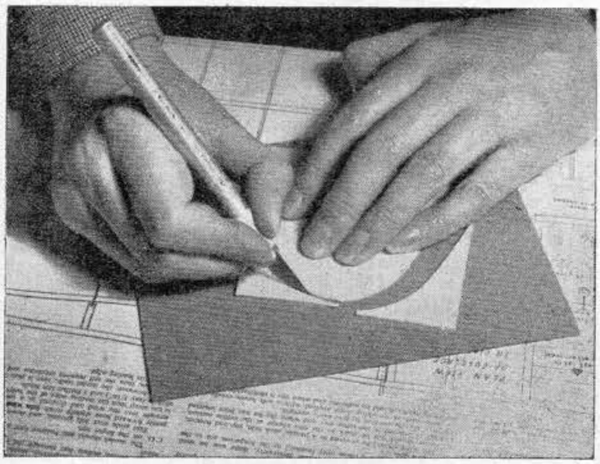


Fig. 8. Cutting out the tail fin and rudder from $\frac{1}{16}$ in. sheet balsa.

When both wing panels have been built, it is a good idea to leave them pinned down to the building board for as long as possible, or for at least half an hour following the completion of the second panel. The first half wing should be set by this time and can be removed from the plan ready for joining to the second panel, which can be left pinned down. Cut away the root rib where necessary in order to accommodate the dihedral keepers and slip the first half into position. With the aid of blocks or books, support the wing so that the tip is raised by the requisite amount (i.e. twice the tip rise specified for each wing). This can be checked by means of a set-square or ruler.

Now remove the panel again and pre-cement all contacting surfaces. When dry apply more cement and set up in position as before, using pins to ensure even contact between the surfaces joined together. Check dihedral again and also check to see that one wing is not twisted in relation to the other. Do not be afraid of using cement fairly liberally at this point. Then set the whole assembly aside for at least two hours (Fig. 7).

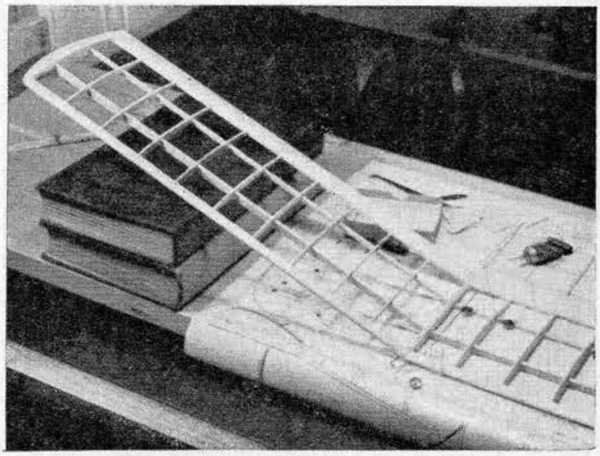


Fig. 7. The two wing halves joined and set up at the correct dihedral angle.

The various tail unit parts such as the fin and rudder (Fig. 8) and tailplane ribs can now be cut out. On the *Tutor*, as on many models of this type, a sheet balsa fin is used. It has a simple trim tab or rudder which is attached to the fin by means of simple "hinges." These hinges are merely pieces of thin aluminium about $\frac{3}{4}$ in. long × $\frac{3}{16}$ in. wide which are inserted into the adjacent edges of the fin and rudder and allow the latter to be bent to the left or right (Fig. 10). A preliminary cut should be made with a piece of broken razor blade and the "hinge" inserted with cement. Material for the hinges is not included in the kit and something a little stronger than the aluminium bottle caps suggested by the manufacturers is to be preferred. In the absence of suitable thin metal, soft copper or iron wire (such as florist's wire) may be used.

The tailplane is constructed in much the same way as the wing and needs little comment. Make sure that the

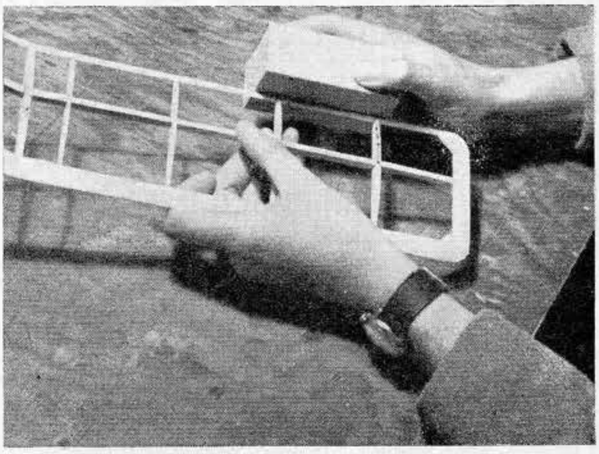


Fig. 9. When a square strip leading edge is employed it may be shaped with a sanding-block.

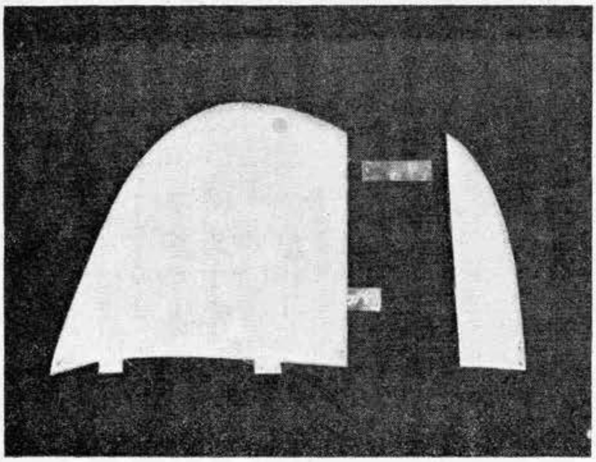


Fig. 10. The rudder is " hinged " to the fin with thin strips of soft metal.

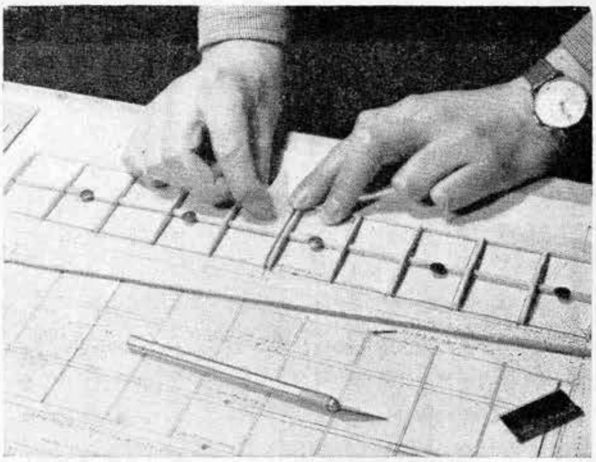


Fig. 11. Aligning the tailplane centre-ribs to ensure accurate positioning of the fin.

two centre ribs are spaced accurately to receive the fin and ensure that they are perfectly vertical so that the fin, when subsequently fitted, is held perpendicular to the tailplane. To make sure of this, cut a right-angled template from scrap balsa sheet, against which each rib can be aligned (Fig. 11).

This completes the assembly of the wing and tail surfaces (Figs. 12 and 13). They may now be gently sandpapered all over in order to remove any slight roughness and to prepare them for covering.

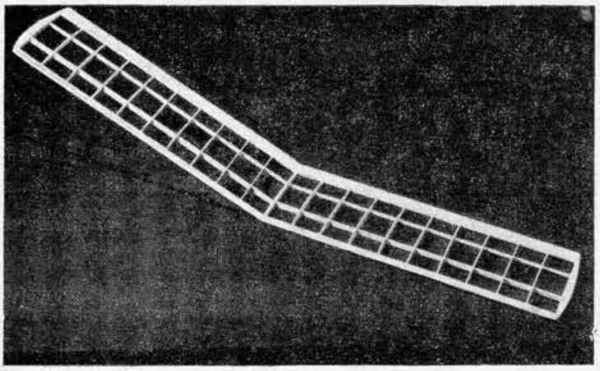
The majority of model wings employ sheet balsa ribs, with shaped strip balsa leading and trailing edges and rectangular section supplementary spars, as in our beginner's model. However, differences will be found in other types, notably in the spacing of the ribs, the type, number and positioning of the spars, the wing tip design and the type of dihedral. For example, on larger and heavier models where stresses are greater, ribs become more closely spaced and spar depths are increased to carry greater bending loads. Sometimes the leading edge portion of the wing, extending back about one-quarter of the chord, is covered with sheet balsa which, if properly used, can result in a substantial increase in resistance to vertical bending loads as well as increasing torsional stiffness.

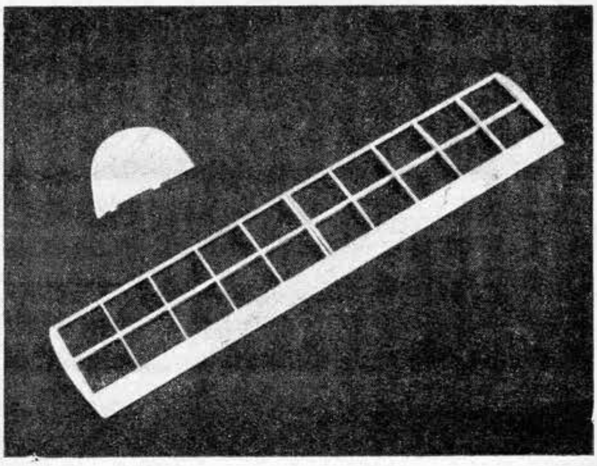
Another type of structure having considerable strength is that featured by some large R/C models and C/L types in which flat spars are let into the top and bottom surfaces of a wing, one immediately above the other, and are then webbed or boxed between the ribs so that the complete spar actually extends to the full depth of the wing section. When this is combined with the sheeted leading edge previously mentioned, so that, in effect, the nose section of the wing forms a complete hollow spar in itself, very great strength and rigidity can result.

In former years, spars (sometimes of box- or I-section) passing *through* the ribs (i.e. not let in either from top or bottom) were favoured in some quarters, because they avoided the slight ridge in the covering which a spar that is flush with the ribs on a curved upper surface will cause. However, modern high performance models have shown the need for strong and rigid wing construction, so that this theoretical aerodynamic advantage is considered less important than the improved structural design otherwise made possible.

The choice of suitable grades of materials for the wing and tail is important if a serviceable model is required. In general, medium-hard, straight-grained balsa is desirable for the spars. If a thin, square-sectioned leading edge is used, for example, this should be fairly hard to resist breakage. If the leading edge is of thicker section, however, and the ribs are more closely spaced, a medium grade is permissible.

Fig. 12 (below). The completed Jasco " Tutor " wing has a span of 30 in. Fig. 13 (right). The completed tail unit. The fin fits between the centre ribs of the tailplane after covering.





MOTOR MISCELLANY

(Continued from page 260)

Temperature Controlled Clearance, by which the makers mean that the piston and cylinder are designed to have a uniform expansion rate which virtually eliminates the possibility of seizure even under the most severe operating conditions. This also means that the piston/cylinder clearance can be much closer to start with, thereby improving compression seal and giving rise (theoretically at least) to better starting, improved and cleaner running and longer life. On the Veco 19, the fit of the piston in the bore above the ports is certainly much closer than we have previously encountered on any other engine of this type. Below the ports the clearance is substantially increased, the bore opening out to reduce piston friction.

As can be seen from the photographs, the Veco 19 is of attractive appearance and robust proportions. We hope to make its performance the subject of a report in a future issue.

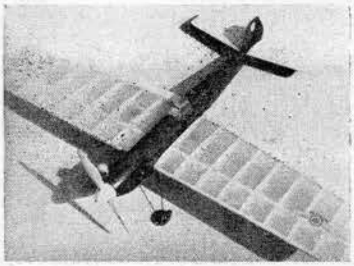
In brief

The stout effort of Gadget Gibbs in securing two world speed records for Great Britain (129 m.p.h. odd in the 2.5 c.c. class and 147 m.p.h. odd in the 5 c.c. class) was, as is well known, due in no small measure to the performance of the engines prepared for the attempts by Fred Carter. As the photographs show, these motors are basically McCoy 19 and Dooling 29 units which have been extensively rebuilt and modified. . . . A new model of the Elfin 2.49 BR reed-valve diesel has just been introduced. Readers will remember that our findings on the original 2.49 BR were not particularly favourable, the performance falling well below that of the 1.49 BR and 1.8 BR. Examination of the new model discloses a number of detailed modifications and a slightly changed external appearance. Test results, which we shall be publishing shortly, should prove interesting.

. . . A revised version of the excellent Dutch Typhoon relay has now appeared. Like the earlier model, it is particularly adaptable to mounting independently of the receiver but is now more compact. Coil resistance was a genuine 5,000 ohms on our test sample. Silver contacts with screw adjustment are used.

MA Model Quiz

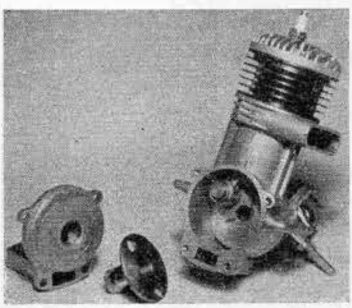
Test your knowledge of model aircraft matters with this interesting quiz. Score 10 points for each complete answer. A total of 50-60 is fair; 60-70 is good, 70-80, very good; over 80, excellent. Answers on page 271.



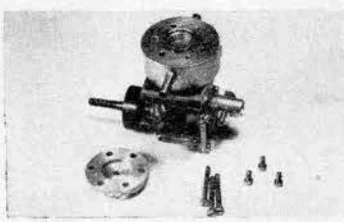
1. This model was a past winner of both the British and European aerobatics championships. Can you give:
   (a) its name,
   (b) the name of its designer.
   (5 points each question)

2. Wakefield Special.
   (a) By whom was the Wakefield Trophy last won with a low-wing model?
   (b) In what year was this?
   (5 points each question)

3. This engine is a:
   (a) Orwick 64 (c) Contestor D.60R.
   (b) O.S. 64 (d) Atwood Champion.



4. This is a water-cooled version of a well-known British engine. Its specification includes two of the following features. Can you name them?
   (a) steel connecting rod.
   (b) anodised cylinder head.
   (c) magnesium crankcase.
   (d) ultra light weight.
   (e) stroke/bore ratio 0.932.
   (f) detachable carburettor.
   (5 points each correct answer)



5. What is the area of an elliptical planform tailplane of 22 in. span and 5.5 in. maximum chord?

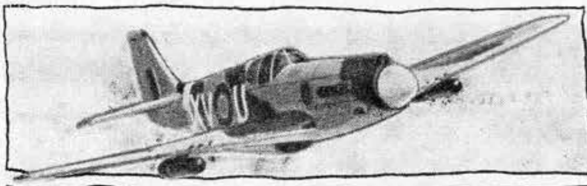
6. (a) Of what aircraft is this a scale model?
   (b) What is the engine installed in this model?
   (5 points each question)

7. The absolute world distance record for model aircraft, as established by the U.S.S.R. in 1952 and recognised by the F.A.I., is approximately:
   (a) 178 miles. (c) 223 miles.
   (b) 206 miles. (d) 235 miles.

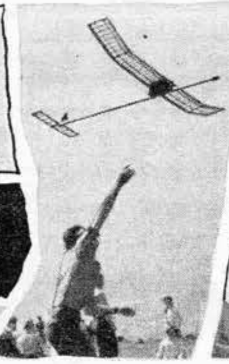
8. Of what full-size aircraft is this John Chinn – designed stunter a scale model?

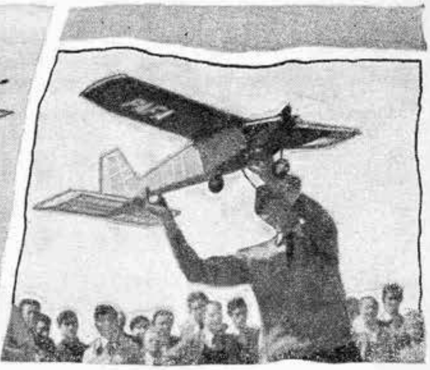
9. In 1949, Eugene Stiles of the U.S.A. set up a world speed record of 129.768 km./hr., using an 8 c.c. Atwood Triumph engine. In what way did this flight differ from other current speed record achievements?

10. Who designed the following famous models:
    (a) Fireball. (c) Blue Dragon.
    (b) Vandiver. (d) Foote-Soarer.
    (2½ points each correct answer)



PHOTONEWS



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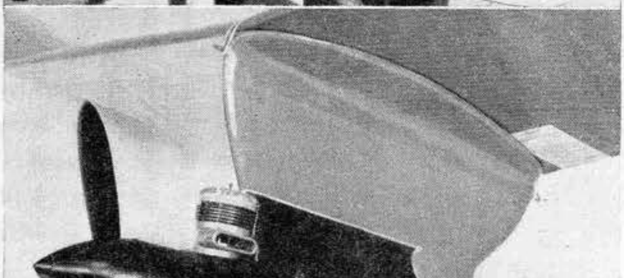
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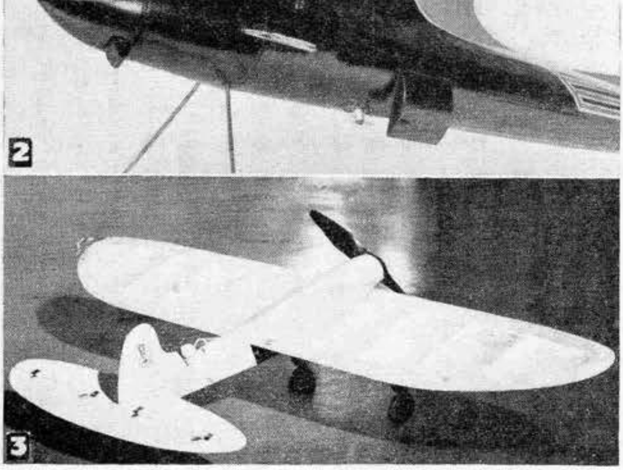
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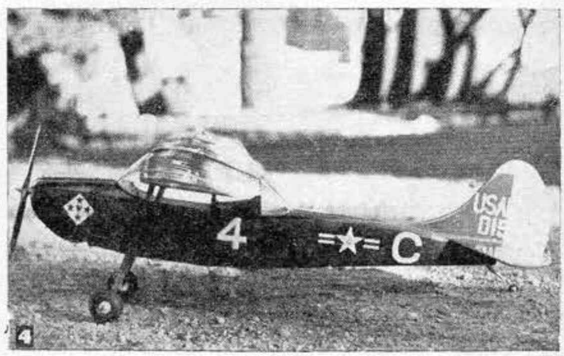
OFF to a "fair" start this month with a photo of Miss Rita Brampton holding a *Sorcerer* built from MODEL AIRCRAFT plans by Mike Ballantyne of the Crystal Palace M.A.C. D. B. Dumble, who took the picture, tells us that there were no less than seven of this popular design flying that afternoon—perhaps we should have headed this paragraph Flying Saucers visit Epsom Downs!

Photo **No. 2** comes from across the Atlantic, where even officials build models. A.M.A. Contest Board chairman, Claude McCullough, sent us this picture of his *Blazer* F/F model. Powered by a Bluestreak 65, it has 900 sq. in. of wing area and a parachute D/T which is housed in a compartment under the fuselage, seen here with door ajar. Claude tells us that the single bladed airscrew was successful in increasing the rate of climb and used up his broken props!

Frog 150-powered stunt trainer in photo **No. 3** is the work of J. Ewens and R. Grey. Designed to initiate them into the mysteries of stunt flying, it took a lot of punishment before meeting its inevitable end. From New Zealand comes the next picture (photo **No. 4**) of the Eric Fearnley-designed Cessna L19-A *Bird Dog*. Power is a Frog 50 and builder A. A. Wright is more than pleased with the flying performance of this machine.

Another scale job is depicted in photo **No. 5**, this time an Aeronca *Sedan* powered by an E.D. 3.46. B.S. Howdon of Swindon sent the picture, but no further information—sorry!

Out for the count, at least that is what you would be if you were able to see the model in photo **No. 6** in all its polychromatic blue magnificence. Designed by R. Nicholls and built by Gordon Oswell, who also took the picture, this Oliver-powered Class A



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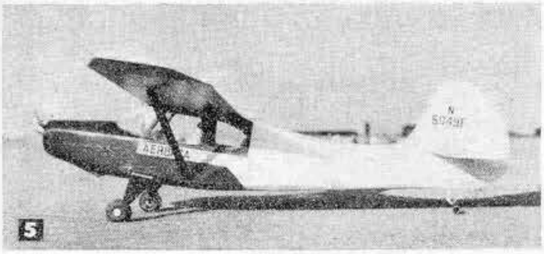

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Team Racer has a 25 in. wing span, weighs 18 oz. and flies at 80 m.p.h. Best contest placing to date—3rd at the Scottish P.A.A. event.

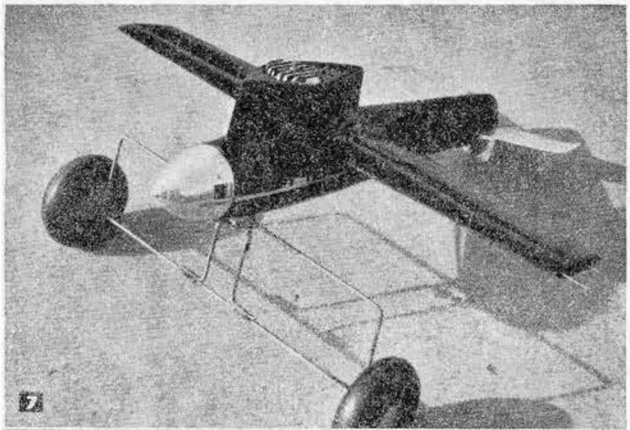
Something else for the U/line boys—a Series 20 McCoy 60 powered speedster built by R. T. Cox of the Grays D.M.A.C. Unfortunately, A. J. Payne, who sent photo **No. 7**, did not give any details of the plane's performance, but constructionally it obviously follows latest trends with its exposed head and metal crutch and tailplane. We don't like the look of those dolly wheels, though!

We are certainly travelling around a bit this month and perhaps we should rename this feature World News [*sic*], because photo **No. 8** comes from Yugoslavia. It is of D. Zigic's radio controlled model which is powered by an Aero 250 M.R. The second cylinder head is a dummy, complete with compression lever, etc. This gives some idea of the amount of work that has gone into this machine, while the translucent wing covering shows some of the neatest construction we have seen for many a long day. D. Zoric sent the picture.

North of the Border for photo **No. 9**, which is from Ian McIntosh and shows a line-up of some of the entries in a Scottish Aero League scale contest held at Condor. In the foreground is W. Valentine's *Tiger Moth* and next to it A. Morrison's *Beaver*. Nice bit of flying surface too.

A study in aspect ratios, or who said A/2 design had stagnated? This interesting photo (**No. 10**) comes from Dick Hirdes of the Bournemouth M.A.S., who is seen holding his 15-1 A/R model, a notable point of which is the sheeted upper surface of the wing. Gent on the left with the 6-1 A/R job is fellow club member Anson Yale.

6



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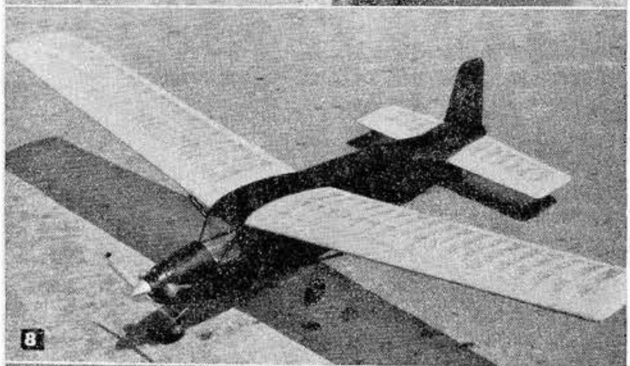

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10

High Noon A/2 GLIDER

by A. LONGSTAFFE

The fuselage of the model has been considerably streamlined since the prototype was first built, and is surprisingly rigid for its weight.

Developed from a highly successful series of designs

THIS model, *High Noon*, is the outcome of a development of A/2 gliders since the class gained international popularity in 1949. A high aspect ratio wing with 25 per cent. tailplane was used to achieve a reliably low sinking speed, the tailplane being mounted high out of the wing wash to give it maximum effectiveness with a normal length fuselage. Ample side area gives the model trouble free towline stability in a wind.

Apart from minor changes to construction and aerofoil section the flying surfaces have remained unchanged from those on the original model. The wire bracing struts and the attachment of wing to fuselage provide great strength on the towline as well as being reasonably crashproof when trees or buildings obstruct the model's approach.

The fuselage has been progressively streamlined and improved in detail and the present structure is surprisingly rigid for its weight—curving the $\frac{1}{16}$ in. sheet sides results in greater stiffness than with flat 3/32 in.

Structural weight at 12 oz. gives ample strength and with ballast at the c.g. makes for stability by reducing inertia effects.

Fuselage

Bind the towhook and wing strut hook securely to the $\frac{1}{4}$ in. $\times$ $\frac{1}{8}$ in. balsa bottom beams. Fix the autorudder lever to the port side of the ply top keel. Cement formers F5 to F8 to the towhook beams and cement the ply keel in the top. Fit the $\frac{1}{8}$ in. sq. short longerons, carefully check the whole alignment, and leave the unit to set.

Cement the $\frac{1}{8}$ in. sq. longerons in place and fix the ends together at the rear having cut them to length and tapered them as shown on the plan. Cement all remaining formers in, checking that no bowing of the fuselage occurs; also fit cabin pillar. Cut the sides, slightly oversize, and cement firmly to the longerons and the flat sides of F6 and F7. Cut the top and bottom pieces and cement these to the formers and towhook beams.

Finally, applying cement with thin slivers of wood to the formers, mould the sides over the formers and seal off along the edges of the top and bottom sheeting. Cut slots for the fin leading edge and spar, fit the ribs and the shaped $\frac{1}{8}$ in. sheet rudder piece. Fit all details: noseblock, dowels, skid, platforms, etc., and cover with lightweight tissue.

Wing and tail

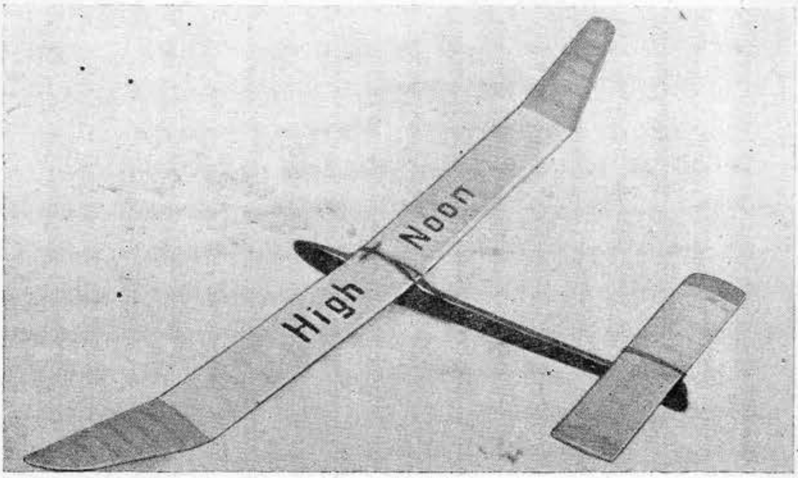
Construction of the flying surfaces follows orthodox practice, the $\frac{1}{8}$ in. sq. bracing being let into the ribs after the wings are otherwise complete. Note the wash out on each tip—most essential !

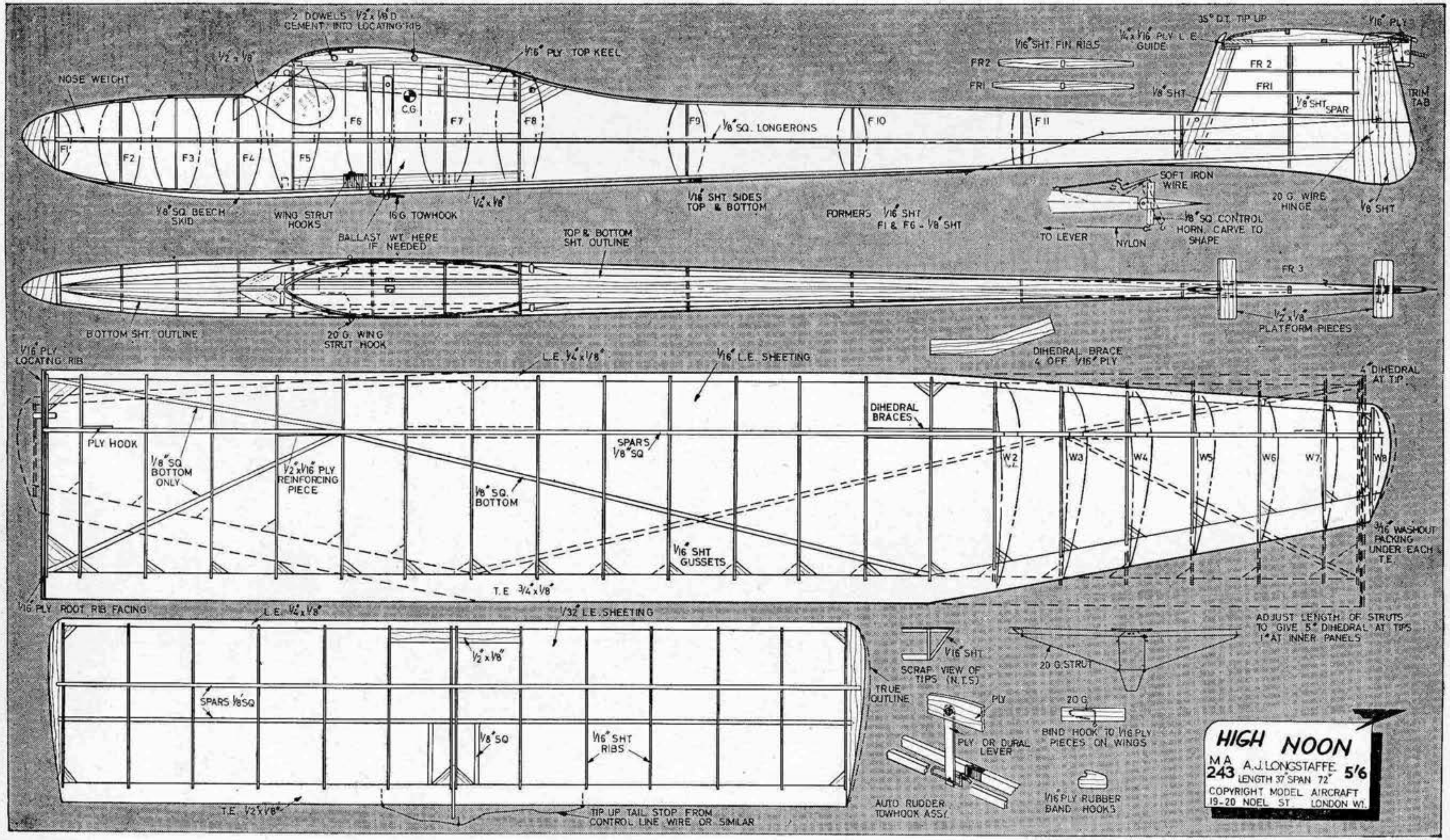
The inboard wing panels are covered with heavyweight Modelspan, and the wing tips and tailplane with lightweight—red is the best for visibility !

Trimming

If built and rigged true to the plan the model should need little trimming. It has proved amply stable on the towline and trimming by short towline flights is much more reliable than hand launches.

The designer's technique is to trim for a slight stall when circling openly to the right, then tighten the circle by adjustment until the stall disappears. The high aspect ratio, washed out wings give the model a surprisingly tight but stable circle which seems to aid thermal hunting.





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

CLUB NEWS

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

CAMBRIDGE M.A.C.

With the co-operation of Pye Radio Ltd., Cambridge, the Cambridge Team Race Rally is to be held again this year.

Pye's have loaned the club their excellent sports-field at St. Andrew's Road, Cambridge, for the contests that will be held on Sunday, August 12th.

Programmes and events have yet to be finalised but it is anticipated that " A," " B " and Combat classes will be held. The ½A race has been dropped.

Full details from Clive King, " Red Roofs," Cambridge Road, Waterbeach.

NORTHERN HEIGHTS M.F.C.

Two members, Gerry Ferrer and Terry Challon, flew their way into the next round of the A/2 at London Area Centralised meet on Chobham Common. A small but enthusiastic party attended the R/C contest at Cranfield on April 16th, although no successes came their way.

The date and venue of the annual gala have now been fixed. It will be held at Halton on Sunday, July 8th, and we hope that all who have supported us so well in the past will once more turn up in strength to enjoy a full and varied programme of flying. Following our policy of rotation for power, glider and rubber models, the Queen's Cup this year will be for international class rubber models. Owing to the lack of tarmac or other suitable surface at Halton, the team race cups will again be run in conjunction with the Enfield club's C/L rally at a later date.

On Friday, April 20th, our clubroom meeting was varied by a visit from David Stock, who brought along some of his incredibly detailed and accurate 1/72 scale models and, together with Norman Wells, gave an interesting talk with hints and tips on solid modelling.

The club will always welcome new members at Friday evening meetings at the Y.M.C.A., Crouch End, Hornsey.

AEROBODS OF NOTE

RAY GIBBS

" Gadget " Gibbs—an aerobod who moves in fast circles—and always around when the speedmen meet. Recently achieved 129.3 m.p.h. (2.5 c.c. class).

SOUTH BRISTOL M.A.C.

Our old motto of " anything on a line " appears to be reviving, as a number of gliders (mainly for sport flying) have made their appearance, whilst interest in combat is keen. Though not as yet fully proficient in this pastime, we find it great fun, and it keeps the spectators happy, too !

A gala meeting in April closed the R.T.P. season; the most spectacular flight occurred when a junior, J. Watson, decided to pep up an already fast team racer with two tip-mounted Jetex units. After 10 sec. it was still accelerating, and the line gave up the unequal battle !

THAMESIDE M.A.S.

Enthusiasm is very definitely up this year, with many more modellers entering the fray and challenging those who always seem to come out top. Miss Glenda Cox placed second in the club flying in her first contest, the Pilcher Cup, and two youngsters, Dave and Pete Halliday, scored 4 : 00 and 3 : 42 in the same contest flying 24 in. Captains—again their first ontest.

Rubber flying is on the up-and-up, but everything went wrong during the Farrow Shield. Mick King, flying in his first ever Wakefield contest surprised the club, the area, and most of all himself by scoring 14 : 15 to top the East Anglian results. Unfortunately Martyn Pressnell, who qualified for the Wakefield and A/2 trials, is unable to go because of B.Sc. exams, but there will be three members flying.

BRIGHTON D.M.A.C.

Our members turned out in force for the second Wakefield and power eliminators at Ashdown. Conditions alternated between strong thermals and terrific downdrafts, making times rather erratic, while a forest fire helped to enliven the proceedings. Both Ian Lucas (*Clot IV*) and Alan Mussell (*Kismet III*) had their jobs soar away with their dethermalisers in operation and as a result both, being assured of places in the power trials, decided not to complete their five flights. Peter Brown took the remaining place allotted to the Area. Fred and Reg Boxall topped the Wakefield and assured themselves the only two trials places for the area. As a result all the area's power and Wakefield finalists and one-third of the A/2 finalists come from Brighton.

On May 6th we held our annual power contest for the Charles Cup, in conjunction with the Hamley Trophy. Seven members entered, Alan Mussell's *Kismet III* proving the winner, closely followed by Peter Brown's *Fifteen* and Fred Boxall's very ancient Mills powered job making its annual outing.

ENFIELD & D.M.A.C.

A large contingent spent a very enjoyable day at High Wycombe, and we are very pleased with D. Walker's win in the class " B " team race. With two models both capable of holding 100 m.p.h. over 2½ miles per tank, we are hoping to be able to pull something out of the bag at the Nationals and other meetings this year.

From all aspects the club is now in a stronger position than ever before, and has a very full programme this year.

WIGAN M.A.C.

Congratulations to J. Wilkie, whose rubber job clocked 10 : 20 to tie for third place in the Gamage Cup.

Usual trek to Turnhill for second power and Wakefield elims. saw Bob Baldwin blow the dust of the first elims. from his model to gain first place with 14 : 54, making him top of combined totals with 29 : 36. We wish him every success at the trials.

WEST OF SCOTLAND AREA

In F/F B. Harris of Prestwick won the S.A.A.'s Montgomery Cup for A/2s from clubmate R. Sleight, who came third this year, second was I. Cochrane from Barnstormers. A fortnight later in the first eliminators for the Scottish U.K. team, R. Ouston of Glasgow M.A.C. topped glider followed by Harris and Sleight of Prestwick. J. Findlayson, Glasgow S.A., again proved that he is top Scottish rubber man. In power the results were: R. Parsons, R. Sleight, R. Cunningham and J. Muir, all of Prestwick.

MONTROSE M.A.C.

Montrose M.A.C. are very busy just now with the final work on the new club building which they have bought and had erected. At 37 ft. × 20 ft. it is much bigger than the garage they have been using, and is almost on the aerodrome. It is hoped that the club will be in full possession by June at the latest, while the more expensive painting and furnishing work will have to wait till the members find it convenient to part with some more " siller."

BUCKSBURN A.T.

Roy Yule had a well-deserved win over all comers at the Angus & District Aeromodelling League's first comp. (A/2) on May 5th, his *Corsair* glider was the only one to fly three rounds, but even then he had a total of only 171 sec. Campbell and Hendry of Montrose wrecked a model each to take 2nd and 3rd places, while six other league members either pranged on the tow-up or refrained from flying at all, such was the wind.

ARBROATH M.A.C.

We held an exhibition in the clubroom recently. A display of some 50 assorted models was gathered together for the static display, which was arranged with a background of paintings and drawings to further the aeronautical atmosphere. A continuous programme of R.T.P. flying was sustained: mostly rubber and Jetex scale.

It is intended to make the event an annual one, as Arbroath is a club which is maintaining its numbers, many of whom are juniors very keen on exhibitions.

HALIFAX M.A.C.

In the Weston cup K. Attiwell topped the Northern Area with four " maxes " and 2 : 44

A group of Finnish enthusiasts with their Wakefield models followed closely by J. B. Pool with "four" and 1 : 47. K. Grant had an off day but thanks to an excellent Gutteridge performance should get to the trials with K. Attiwell.

One week later we met and defeated Bradford in the Northern Area knock-out. The result hung on B. Summerscales's last power flight, 1 : 40 needed, rain falling and wind blowing. He went o.o.s. in 1 : 47. Now we have to fly against Hull "Pegasus" (last year's winners).

SECRETARIAL CHANGES

YORK M.A.S. C. G. Clay, 238, Burton Stone Lane, York.

NEW ADDRESS

HULL "PEGASUS" M.F.C. E. M. Smales, 39, Bilsdale Grove, Southcoates Lane, Hull.

QUIZ ANSWERS

1. (a) Ambassador, (b) Alan Hewitt. 2. (a) R. N. Bullock, (b) 1929. 3. (d) Atwood Champion. 4. (c) Magnesium alloy crankcase and (e) s/b ratio 0.932. 5. 95.03 sq. in. 6 (a) Cessna 170, (b) Allbon Dart Mk. I. 7. (d) 235 miles. 8. Fletcher FD-25B Defender. 9. The record was for "speed in a straight line," i.e. F/F. 10 (a) Jim Walker, (b) J. R. Vanderbeek, (c) C. E. Bowden, (d) Donald Foote.

CONTEST CALENDAR

June 24th	**KEIL TROPHY.** Power. **FROG JUNIOR CUP.** Rubber/Glider. Decentralised. West Hants Rally, R.A.F. Andover. Midland Area Rally, R.A.F. Wellesbourne, near Stratford-on-Avon.
July 8th	East Anglian Area Gala, R.A.F. Debden. Northern Heights, Gala, Halton Aerodrome, Bucks.
,, 15th	Enfield C/L Rally, Enfield Playing Fields (by Gt. Cambridge Rd.). Croydon Gala, Chobham Com.
,, 29th	Epsom Slope Soaring Meeting, Box Hill, Surrey.
Aug. 4-6th	**WORLD POWER CHAMPIONSHIP**—Cranfield.
,, 5th	I.R.C.M.S. Int. R/C Meeting.
,, 12th	Cambridge T/R Rally, Pye Sports Field, St. Andrews Road.
,, 19th	London Area C/L Meeting, Heston.
,, 25-26th	Scottish P.A.A. Rally, R.N.A.S. Station, Abbotsinch, nr. Glasgow.
,, 26th	South Midland Area Rally, Cranfield, Beds.
,, 26th	Devon Rally, Woodbury Common, nr. Exeter.
Sept. 2nd	Northern Area Gala
,, 9th	Area *K.M.A.A. CUP.** A/2 Glider.
,, 9th	**HALIFAX TROPHY.** F.A.I. Power.
,, 16th	All Brit. Rally, Radlett, Herts.
,, 23rd	Area. ***MODEL ENGINEER CUP.** Team Glider. **GUTTERIDGE TROPHY.** Wakefield.

THE NATIONALS RESULTS

THURSTON CUP

1. R. Boxall	Brighton	12 : 00 & 6 : 34
2. E. Cartwright	North Lincs	12 : 00 & 2 : 11
3. L. Greygoose...	Anglia	... 11 : 45
4. G. Cameron ...	Leeds	... 11 : 04
5. K. Leeson	Derby	... 10 : 49

SHORT CUP

1. R. A. Ward	Croydon	5 : 34
2. B. Faulkner	Cheadle	5 : 32
3. A. Mussell	Brighton	4 : 35

GOLD TROPHY

1. P. Russell	Worksop	310
2. L. Steward	West Essex	303
3. E. G. Lloyd	R.A.F. M.A.A.	283

S.M.A.E. TROPHY

1. J. Nixon	C.M.	306
2. R. Donohoe	Kersal	296

SIR JOHN SHELLEY CUP

1. T. W. Smith ...	English Electric	12 : 00 & 6 : 39
2. G. Ford	Novocastria ...	... 12 : 00
3. A. Sedgebeer...	Sharston	11 : 19 & 1 : 35
4. J. Hartley	Wolverhampton	... 11 : 19
5. J. West	Southern Cross	... 11 : 02

MODEL AIRCRAFT CUP

1. J. Cartwright...	Hull Pegasus	12 : 00 & 6 : 54
2. S. Marshall	Boston	12 : 00 & 6 : 51
3. A. Alexander...	Cowley	12 : 00 & 1 : 45
4. R. Pollard	Tynemouth ...	... 11 - 50
5. R. J. North	Croydon	... 11 : 37

BOWDEN TROPHY

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SUPER SCALE TROPHY

1. Q. Wilson	Maybole	80 *(Prestwick Pioneer)*
2. J. Bridgwood...	Doncaster	79 *(Heston Phoenix)*

TAPLIN TROPHY

1. J. Nixon	C.M.	368
2. G. W. Parkinson	C.M.	288

LADY SHELLEY CUP

1. J. Marshall	Hayes	6 : 09
2. P. Hedgeman...	Hayes	4 : 33
3. S. Hinds	Wallasey	4 : 27

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DAVIES TROPHY "B"

1. W. Martin	Chingford	9 : 25
2. R. Tuthill	Enfield	

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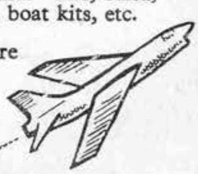

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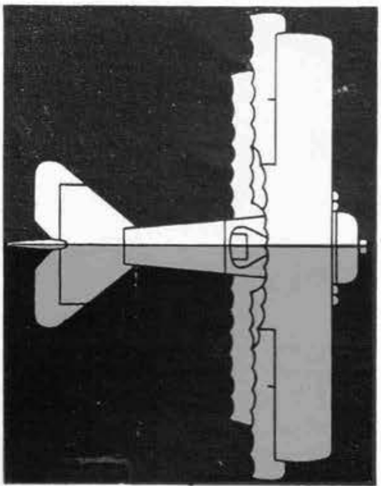

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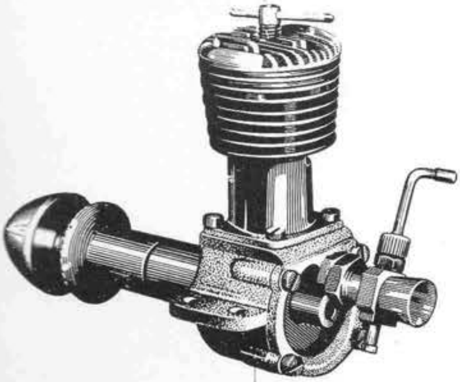

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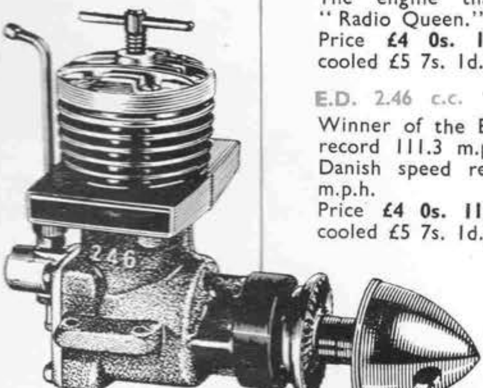

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