Aero Modeller

March 1972
15p
(USA & Canada 75c.)

INCORPORATING
MODEL AIRCRAFT

MAP HOBBY MAGAZINE

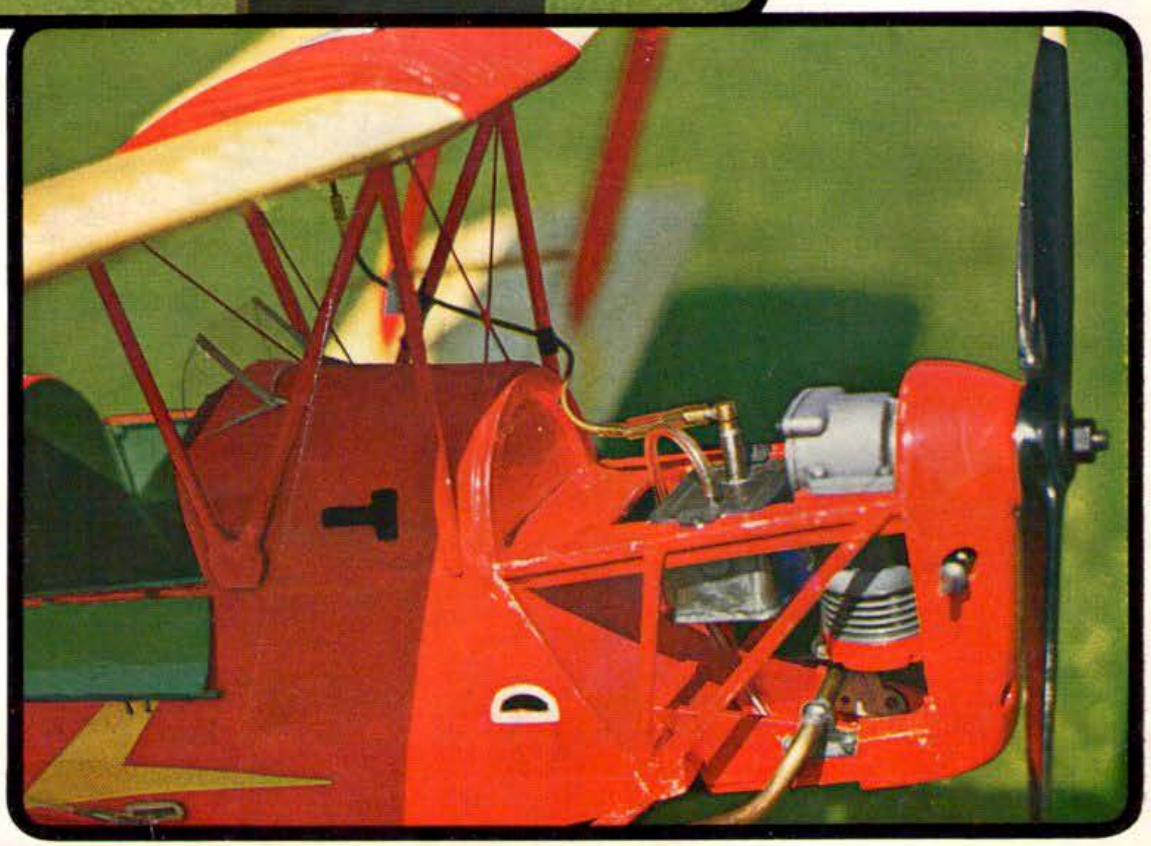
Harold Towner's 50 inch Super Scale TIGER MOTH

'Little Hinney' A/1 glider design

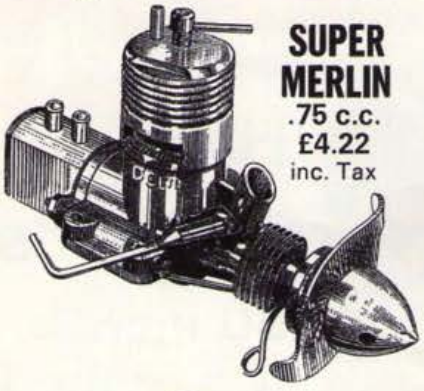
Return of the CO_2 engine

Arado Ar 234 'Blitz' scale drawings

Gadget Review



at your model shop !



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March 1972 Volume XXXVII No. 434

CONTENTS

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COMMENT

Britain's answer to the R/C Hobby section at the huge *International Toy and Hobby Fair* in Nurnberg will be found at Sywell aerodrome on Easter Sunday and Monday. Every prominent manufacturer will have his products represented in this great show. It will be a family affair, located within easy reach of the Motorway system and having the double attraction of a splendid air display coupled with model flying. Make a note of the dates, April 2nd/3rd will start the season with a perfect boost. Promoted by Model and Allied Publications, the R/C Expo introduces an entirely new approach to exposure of the hobby to the general public.

on the cover

Harold Towner poses with the feature plan in this issue, his 1/7th scale Tiger Moth for free flight or radio control. Colour schemes are many and varied for this machine, so there is no excuse for a rash of red and yellow examples! Close-up shot reveals scale type structure of the nose normally hidden by the removable tin-plate cowl.

next month

TWO FREE PLANS – a 28 in. span Jetex-powered free flight model, aptly named **Jetset**, plus **Candice**, a simple, fun, all sheet canard design by Ray Malmstrom for rubber power. Uses of **carbon fibre** in modelling. Reports on the **New Zealand** and **Indian Nationals. Engine test** on the **O.S. Pet Mk III, Control Line News, Aircraft Described** and all the regular features, on sale March 17th.

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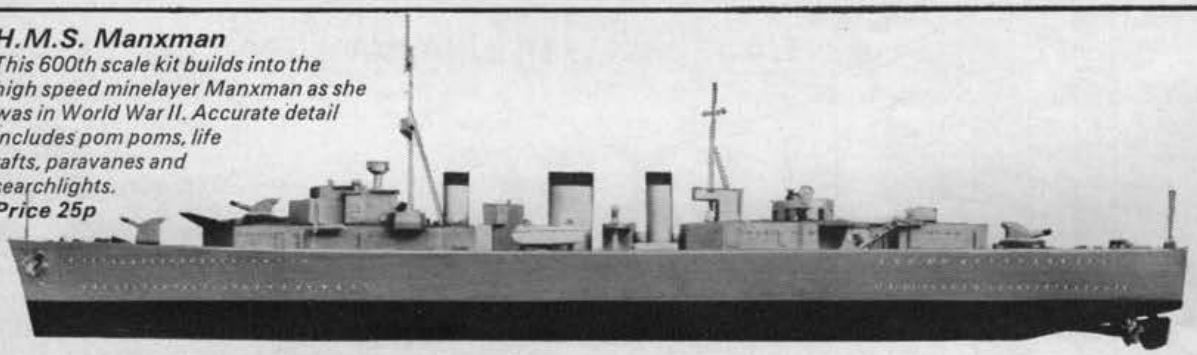

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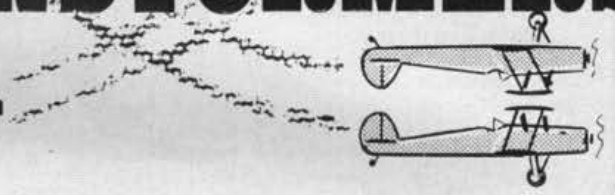

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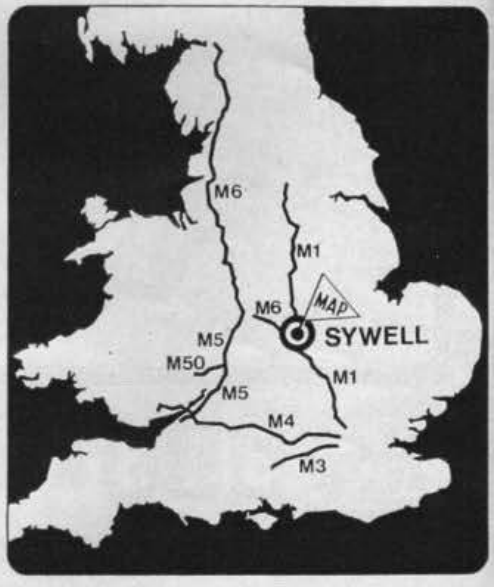

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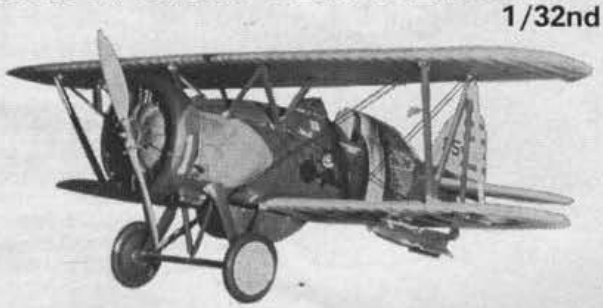

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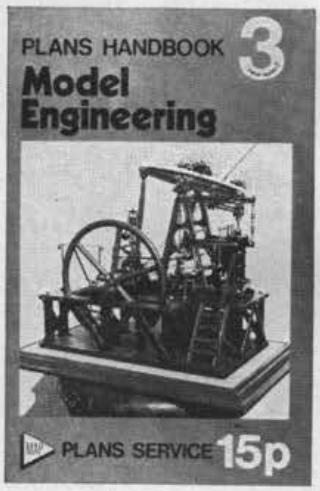

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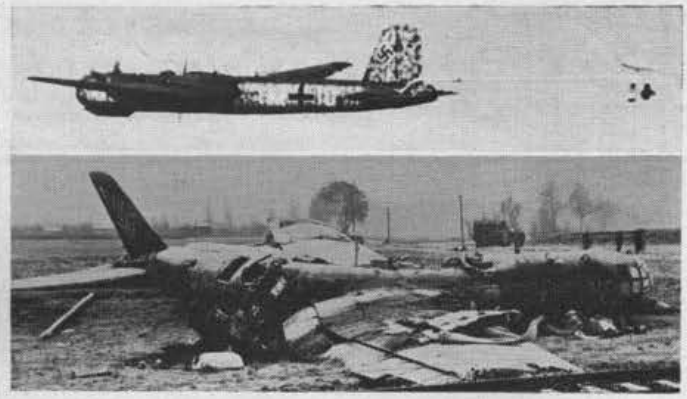

He 177 Greif - The Difficult One!

Few front-line W.W.2 heavy bombers could have given the designers, ground and aircrews more operational headaches than the 4-motor Heinkel He 177 – yet it saw combat service on the Eastern Front, attacked Allied convoys – with the revolutionary radio-controlled Henschel Hs 293 glider-bomb – and, a rarely discussed subject, took part in raids on the U.K. **Aircraft Profile No. 234 – HEINKEL He 177 GREIF (GRIFFON)**

In Profile No. 234, author Alfred Price traces the complex story of 'The Difficult One' from early development through to eye-witness accounts of Hs 293 assaults on merchant ships.

Until the advent of this Profile, *no* previous 5-view drawings (and here they are in superb colour) have captured the subtly difficult lines and details of the He 177. Four pages of colour plates plus 20 pages of unusual photos, schematic drawings, and around 7,500 words.

Profile No. 234 Heinkel He 177 Greif now immediately available from your local book or model shop and some newsagents. Only 35p. In case of difficulty, write direct to Publishers enclosing 41p to cover postage & packing.

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The North American P-51 Mustang, World War II fighter has never been so well detailed as in the March SCALE MODELS special feature. Pat Lloyd has measured-from-life scale drawings from the example in the Imperial War Museum, London, and Bob Jones provides colouring and marking data plus a Mustang kit appraisal, including that for the latest Revell 1/32nd scale kit, photographed in colour on the cover.

The Soviet KOTLIN Class destroyer provides scale modellers with yet another of Bob Sweet's series of plans. More on Luftwaffe camouflage schemes. Card Modelling, Book Reviews, Historical Collections plus a first report on scale models at the 41st MODEL ENGINEER EXHIBITION, will all be found in this latest issue.

Scale Models

ON SALE February 11th Price 15p

Heard at the HANGAR DOORS

The U.S.S.R. have not been represented at an R/C world championship since 1962, but are now catching up fast in this competitive sport. Record holders Velichkovsky and Viaziguine seen here with Natisch and their aerobatic models incorporating all the modern trends.

SOVIET RECORD onslaught during the last four months of 1971 was considerable, and the achievements claimed are worthy of very close scrutiny. In this comparatively brief period, the U.S.S.R. has attained standards in speed and flying which have thus far escaped the grasp of America's most talented and long experienced record specialists. The September trials at Dahlgren were a bitter disappointment for many aspiring members of the A.M.A. who failed by small margins to improve speed and altitude records despite their technological advantages. Now they have even higher targets to aim for. The Soviet claims actually began with P. Motekatis' rubber speed record of 144.9 km./h. (90 m.p.h.) on 20th June. Then, on 21st September, at Klementyera, V. Goukoune and V. Myakinine claimed 343.92 km./h. (213.7 m.p.h.) for Radio Control speed. On one run they were timed at 421 km./h.. (261.58 m.p.h.!). This record is still tentative but on 25th October the same team fitted two floats to the model and set up a hydro radio control record of 294.98 km./h. (183 m.p.h.), which has been homologated. The model is patterned much after the style of the U.S. speed designs, has a Super Tigre G 60R ABC engine and Graupner Varioton radio. Span is 1320 mm. (52 in.), length 1175 mm. (46 in.) and weight 4½ lb. On 20th September Leonide Aldochine broke the R/C Glider Speed record with 182.25 km./h. (95 m.p.h.), using a 1730 mm. span (68 in.) design of extreme simplicity. The record spate continued, and on 26th September, Doubenetsky and Laryukhin increased the free flight power speed record to 169 km./h. (105 m.p.h.). More was to follow in the next month, when P. Velichovsky and Vyaziguine flew a straight line distance of 102 km. (63.3 miles) with a Radio Control Hydromodel on 16th October. Five days later the same pair increased the distance in a closed circuit record at Peromaiskis to 194.75 km. (121 miles) with the same hydromodel, and on 13th November they upped the Radio Control Hydro duration record to 3 hours 28 minutes 39 seconds. Two more claims, yet to be homologated as World Records by the F.A.I., were made in December. On 6th December, L. Lipinsky beat the long standing (1964) Jet control line speed record held by Zanin with 395 km.h. (245.4 m.p.h.), and the following week, Abrageev established a straight line distance record for Radio Control Helicopter on December 12th of 1,842 m. One wonders what is to follow. This series of claims could give the U.S.S.R. a total of 21 out of 44 established F.A.I. model world records. After a year in which the U.S.S.R. abstained from entry in control line and radio control International contests, in fact, participated only in Free Flight World Champs (to considerable effect), this revelation of superior technical standards will not find easy acceptance among other nations of the world, especially those who have struggled so hard to achieve similar performances. We hope that full details of how the records were established will be revealed in the Soviet magazines. What has appeared so far is extremely superficial to substantiate the claim.

The Americans do, however, gain a couple of creditable records. Eugene Rock established a height record for R/C Helicopters at 198 metres on 6th September and Bob Reed has pushed the duration record for R/C Floatplanes to 5 hr. 9 min. 6 sec. as of 29th January this year. Also on the same day Manfred Kufner, of Germany, broke Dieter Schluter's Helicopter duration record of 27 min. with a remarkable flight lasting one hour, 12 min., 23 sec. It must be emphasised that not all of these records have been homologated.

HOWARD McENTEE, a pioneer among radio control model fliers, able columnist on all model topics and an editor of *MODEL AIRPLANE NEWS* for the very important post WWII years, died on January 13th. His kindly nature endeared him to everyone and his influence in producing simple forms of proportional radio control for the sports modeller will long be remembered. Howard's model activity spanned a half-century, from the earliest days of spruce and silk to the introduction of balsa, the first production petrol engines, the first radio control, and through to the ready-to-fly 'kit' of today. His guide and mentor was Charles H. Grant and his associates in aeromodelling design of the 'thirties' are today the household names of the U.S. Model Industry. For his services to the hobby he was elected to the A.M.A. 'Hall of Fame', and rightly so, for Howard represented the deep thinking visionaries who have played a great part in extending American 'know-how' and influence throughout the whole world. He will be sorely missed. We extend the deepest sympathies of all modellers to his wife Elinor in her great loss.

MAURICE PITHERS may be a less familiar name, but to those involved in the beginning of control-line it will be recalled as that of a pioneer in multi-engined scale models. Maurice put four .60s, complete with full spark ignition systems into *Liberator* and *Fortress* models when most modellers were terrified to fly the then-new KK *Phantom*. Alas, on January 8th Maurice (in private life a chef of considerable repute) died following a heart attack.

De Havilland 82A TIGER MOTH

a superbly detailed 50 in. span, one-seventh scale version of the classic biplane, designed for free-flight or radio control, using 2·5-8 cc. engines, designed by scale doyen HAROLD TOWNER

PLANS NOTICE: FULL-SIZE COPIES OF THIS $\frac{1}{7}$th SCALE REPRODUCTION OF THE TWO SHEET PLANS ARE AVAILABLE AS PLAN NO. RC1131. PRICE £1 POST FREE, FROM AEROMODELLER PLANS SERVICE, 13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTS.

GEOFFREY DE HAVILLAND'S Tiger Moth is perhaps the most well-known biplane of all time, and with so many of these machines still flying today, it seems almost unbelievable that it first saw the light of day over four decades ago.

Designed and built in 1931 as a solution to the problem of producing an efficient primary, intermediate and advanced training aeroplane which would be cheap to produce and operate, the *Tiger* fitted the bill perfectly. However, it rapidly found other operational roles in the Services, including formation flying, reconnaissance, bombing and photographic duties. More recently, Tigers have found favour with film companies and are featured in such aviation epics as 'The Blue Max' and 'The Red Baron' – although they are not so easily recognisable!

Virtually viceless in its flying characteristics, the 'Tiggie' gives only a gradual stall and a slow resultant spin. As a model, these features provide a most stable machine, but one fully capable of aerobatics if the control and power is available.

The design presented here is Harold Towner's latest scale model, being intended primarily for four function proportional radio control using .49 cu. in. engines, but could equally successfully be flown as either a single channel R/C model or free-flight, in which case 2.5-3.5 c.c. engines would be adequate. A glance at the plans reveals that this is no beginner's machine, but a *modeller's* model! All the information is provided for a really true-to-life replica (note how the fuselage longerons are to scale thickness . . .), the amount of detail included on the model, depending on the builder's ability, ingenuity and patience! Being aimed at the more experienced modeller, the following instructions do not cover every point to be encountered, but will point the less-able enthusiast on the right lines and guide him through the tricky parts! All flying surfaces are readily detachable to facilitate access and ease of transportation. R/C installation is not shown, this being dependent on the equipment used and the degree of interior detail envisaged by the constructor, but remember to keep the majority of the weight as far forward as practical to maintain the correct C.G. position.

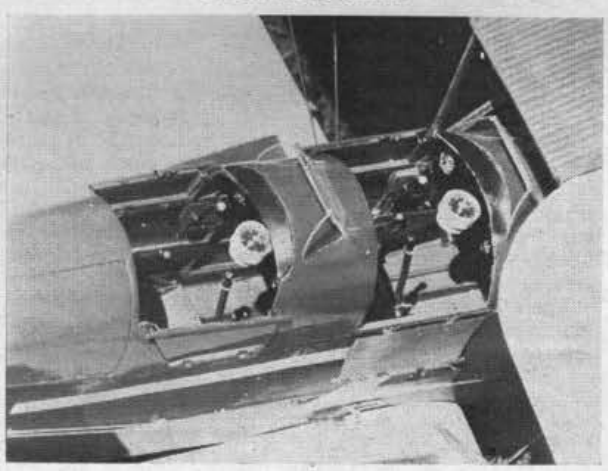
Start work on the fuselage by building a pair of basic sides directly over the plan. Note that the longerons are from $\frac{1}{4}$ in. square spruce, while uprights and diagonals are from $\frac{1}{8}$ in. dia. birch dowel, except where stated. Take care to make accurate joints and use a good quality glue. Remove from the plan, then cut out all the $\frac{1}{8}$ in. square spruce cross braces. Reposition the plan on the building board so that the position of F1 lies approximately $\frac{1}{4}$ in. off the edge of the board – this is to enable the fuselage frames to be inverted flat over the plan. Pin the cross braces for the top of the fuselage to the plan view, invert the fuselage frames and glue securely, checking that the sides are kept vertical. When dry, add the diagonals, followed by the bottom spars and their diagonals. Remove from plan, then draw the nose sections together, using temporary cross struts, which will be removed later.

The cabane wires are now bent from 16 s.w.g. wire, accuracy being most important. Note how the two side assemblies are connected at the top with brass tubes soldered in place in order to assist their lining-up. Bind these struts to the fuselage sides as shown, then add the $\frac{1}{8}$ in. ply fairings. These are grooved with a saw to accept the wire and are then epoxied in position.

Cut out the $\frac{1}{8}$ in. plywood engine mounting plate to size, then add the hardwood bearers, spaced according to the width of the engine crankcase used. Note that this bearer assembly is to be glued to the longerons, which are inclined upwards, so to restore the thrust line hardwood or dural packing pieces should be filed to shape. When satisfied, drill the engine mounting holes, remembering to incorporate the appropriate sidethrust, depending upon the direction of rotation of the crankshaft. Most people will no doubt leave their motor unmodified and so select right thrust! See plan. Harold opted for absolute realism and had his Merco 29 modified to clockwise rotation – hence the left-handed prop shown! The whole unit may now be securely epoxied into position, including the $\frac{1}{8}$ in. ply fill-in reinforcing the longeron joints.

The $\frac{1}{8}$ in. plywood firewall may now be epoxied in place, followed by the obechi gusset. Laminate the nose cowling from $\frac{1}{4}$ in. sheet obechi, hollowing the laminations before gluing to ensure adequate clearance for the motor. Carve and sand to approximate shape, then glue in place. The lower part of this cowl is connected to the bottom of the firewall by a plywood plate complete with side members, and reinforced with obechi fillets.

Superb cockpit detail evident in Harold's model – note the opening cockpit access doors and full instrumentation, plus flying controls. Add as much detail as you like, but keep an eye on those scales!



No, the picture is not back to front, the prop is left-handed! Harold's Merco 49 has been modified to clockwise rotation for true scale effect. Check that the side thrust on your model is suited to the crankshaft direction of the motor to be used.

The dummy centre section tank should be made up as shown (or, for true scale fanatics, a tinplate header tank could easily be incorporated within, but this is not drawn) and attached to the cabane struts so as to position the wing at a positive angle of 4° incidence to the top longerons. Also ensure that everything is truly square – a couple of long straight balsa strips pinned temporarily to either side of the tank will clearly reveal any inaccuracies. The tank is secured at the rear by binding the trailing edge to the rear cross wire, leaving off the last inch of sheeting until this job is complete. The front is keyed into position with scrap material epoxied into the slot for this purpose. The 20 s.w.g. bracing crosswires are now bound and soldered into position and are made fast to the motor bearer plate below before the centre section wing root ribs are cemented either side of the tank, again at 4° incidence.

Formers F1-9 are then cut out and glued in position, followed by the 3/16 in. x 1/16 in. stringers before the rear decking is sheeted with 1/16 in. medium soft balsa. The section between F1 and F2, F3 and F4 may also be sheeted at this stage, cutting small grooves to fit around the wires.

The $\frac{1}{8}$ in. ply wing tongue is glued and screwed securely to the fuselage base, cutting away the lower longerons to accommodate it. If foot pedals are to be fitted, the rudder bars should be fixed before the subframe is glued finally in place.

The next stage is to assemble the undercarriage and then to bind and epoxy it to the reinforced underside of the fuselage – the front radius rods are likewise attached. The lower portion of the cowling between the upper and lower longerons is sheeted with 1/32 in. ply, fairing it into the upper sheeting, while $\frac{1}{8}$ in. hard sheet balsa (cross grained) is added to the fuselage floor from the firewall to just behind the rear seat.

Fitting of all detail parts, such as oil tanks, opening doors, footholds, cockpit furnishings, etc., may be added during 'waiting time' while the flying surfaces are made.

Wing construction may seem laborious at first, but it is surprising how the repetitive work becomes fascinating! Cut out ply or metal templates for the ribs and riblets, a separate template being placed on the ribs to mark the cut-away portions, which can be filled in after the wing is assembled, if found advisable.

Each panel is built in a similar fashion – start by pinning the leading and trailing edges, together with the tip piece, over the plan with appropriate packing to suit the camber of the underside of the ribs. Cut out the two spars and insert the ribs upon them loosely, without any glue. Pin the spars in position, again with suitable packing underneath, then position each rib accurately before applying a PVA glue to each joint. When dry, add the riblets to the top surface (two between each rib), allow the glue to dry once more, then remove from plan and add the single riblets between each rib on the underside. Carefully hinge the ailerons if the model is to be flown radio control, but glue them securely if the machine is destined for free-flight use. Complete by adding strut anchorage points and aileron linkages.

Tailplane features conventional construction and again the elevator should be hinged only if an R/C model is contemplated. Use thick aluminium 'hinges' for F/F models, so that the elevator may be adjusted for trim. The fin/rudder are equally conventional, and are designed to bolt to the tailplane, which, in turn, is bolted to the fuselage – see details on plan.

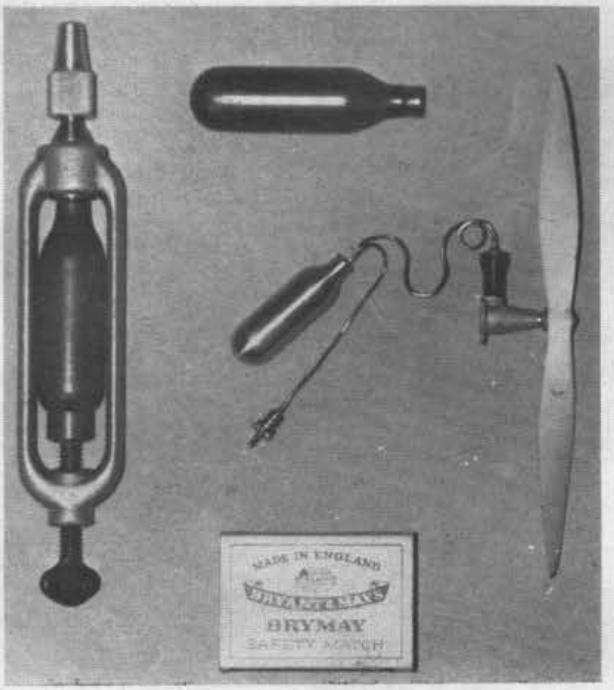
It is advisable to rig all four wing panels in position using dummy struts, then to glue the wing root ribs in position – noting at the same time the different dihedral angles of the upper and lower wings. The correct interplane struts can now be made and bolted to the tin clips. Bracing wires are added and securely epoxied in position. Where the interplane struts and the bracing wires emerge, glue card or balsa supports for the covering.

The upper wing roots will tend to sag at the trailing edge owing to the tension of the wires, hence a small length of $\frac{1}{8}$ in. square balsa protrudes from the centre section wing root and suitably cut away in the wing root so that the wing root rests upon this projection. This is quite sufficient to cure this problem.

Correct, accurate rigging is most important, and it is a good idea to make plywood jigs on wooden bases cut out to receive the wing tips for rigging purposes. The designer used the concrete floor of his garage to set up the rigging operation, making off in chalk the various datum lines, and using lengths of $\frac{1}{4}$ in. square wood to check the heights, etc. Measure

Continued on page 160

View of the designer's Tiger Moth which visitors to the Model Engineer Exhibition saw on the M.A.P. stand. Much interest was shown in this highly detailed model.



CO_2 Reborn!

John Stennard describes his experiences with the BROWN JUNIOR CO_2 engine — a noiseless, clean and odourless power plant.

The 'British Standard' matchbox serves to illustrate the Brown Junior's diminutive size. Object on the left is the 'Load-n-Launch' gun, while at the top of the picture is a spare CO_2 cartridge.

WHEN I READ the article on the Brown Junior CO_2 motor in the May, 1971, *Aeromodeller* I was immediately interested in obtaining one. As a Handicraft teacher and keen modeller with main interests centred on radio control, I always have access to school playing fields but these are often too small and too surrounded by obstacles to permit such flying. I have, however, taken advantage of our school fields to fly small gliders, rubber and Jetex designs, so that the arrival of a new source of power for small models was of great interest.

I wrote to *Brown Junior* for further information, enclosing a dollar to show that I was really interested. Within two weeks I received a very interesting leaflet giving some specifications, the prices and a history of its development. Unfortunately no dimensions other than the weight (which is $\frac{6}{16}$ oz., including one tank) were given. Interesting points from this leaflet were that the motor has a maximum duration of around 30 seconds on one tank, depending on the speed setting, a capacity of .005 cu. in., a .15 cu. in. tank and propellers of 3-8 in. dia. can be used. Besides the motor unit (motor, tank and filler valve) one must also purchase a *Load-n-Launch Gun*. The CO_2 cartridges are screwed into this gun, which in turn is used to fill the tank via the filler valve. The launch part of the gun is used for the Micro-jet, this is a standard tank with a special valve unit which can be used to provide thrust for a small glider and fires for 5 seconds. I was unable to resist and sent for a motor unit, gun and Micro-jet, for the same cost as I could have bought a good .40 cu. in racing motor!

MODIFICATIONS TO KEILKRAFT FLYING SCALE AUSTER ARROW, 20½ in. SPAN, TO POWER BY BROWN JUNIOR CO_2 MOTOR, .005 cu. in. – SCALE FULL-SIZE

1 2 mm Ply bulkhead

2 Undercarriage strengthened with gussets and glued with epoxy

3 Floor of tank bay $\frac{1}{32}$ in. balsa sheet

4 Wing strengthening gussets

5 Centre section $\frac{1}{32}$ in. sheet balsa

6 Nose built up to original plan size with soft block

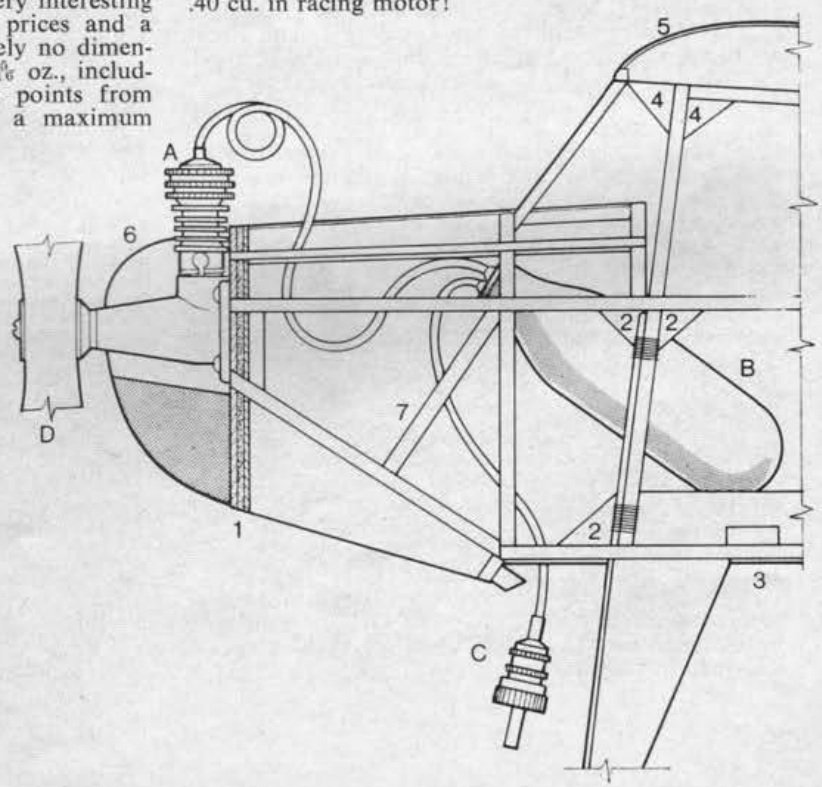
7 Extra strut

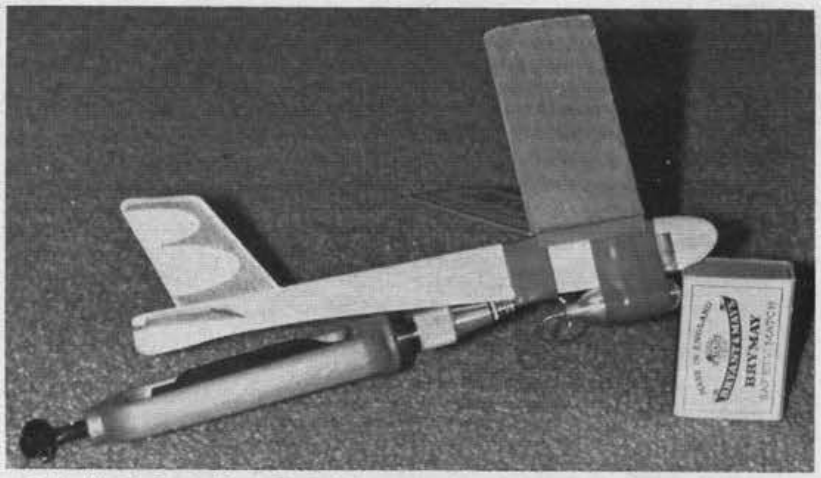
A B.J. CO_2 Motor

B Fuel tank

C Filler valve

D B.J. 5½ in. plastic prop





The Micro Jet rather crudely (adhesive tape) mounted on a small chuck glider gave good results, but a purpose designed model would be preferable – flights of 30 seconds duration are claimed from the five seconds thrust. The thrust from this unit commences as soon as the launch gun is disconnected. A Micro Jet weighs just ½ oz., and will power gliders up to approximately 12 in. span.

I decided that although I did not know the motor dimensions, method of fixing tank, etc., I would try to have a suitable model ready. The motor took nearly four weeks to come and by this time I had two models completed except for the nose sections. These were a KeilKraft Flying Scale *Auster Arrow* and a *Nieuport* which I hoped would be about the right sort of size for this motor. When the motor arrived it proved to be all that I had hoped it would be – it is a perfect miniature and even floods and backfires like its big brothers!

The system has many interesting features. The cylinder barrel is rotated to alter the engine revs, the full range of speeds are within ¼ of a turn. All removable parts, such as the cylinder head, are sealed by rubber 'O' rings and need only finger pressure to tighten them. The fuel pipe (gas pipe?) is copper tube and can be lengthened, shortened or replaced using a normal soldering iron. The necessary connection points on the cylinder head, tank and filler valve are brass to facilitate this while extra tanks can be connected for a longer motor run if required.

When several loops have been made in the copper tube joining the tank to the engine the tank needs no further mounting at all, in fact it is quite rigid, yet flexible enough to absorb landing shocks. A further length of tube comes from the cap of the tank and terminates in the filler valve, which needs to be easily accessible as it has to be gripped tightly with the fingers for tank filling. To fill the tank you plug the filler valve into the nozzle of the loader and after a few seconds slide forward the knurled part of the loader. This releases the filler valve and the tank is now full. The tank cannot be overfilled, for as soon as the pressures in the tank and cartridge are equal the flow stops. The motor is then just flicked as normal and usually starts immediately, if sometimes backwards! Flooding occurs, with power loss, if liquid CO_2 reaches the motor, but this is easily avoided by mounting the tank as near vertical as possible and by having the fuel pipe connection at the top. I have tried various propellers but the one supplied with the engine, 5½ in. plastic, has proved to be the most efficient. According to the information supplied, the motor has been used with models as light as ¾ oz. and as small as 15 in. span, and as big as 3 oz. and 28 in. span.

With the Micro-jet, the filler valve also acts as the jet nozzle and does not shut off. The tank may be mounted on a small glider of up to 12 in. span and ½ oz. in weight.

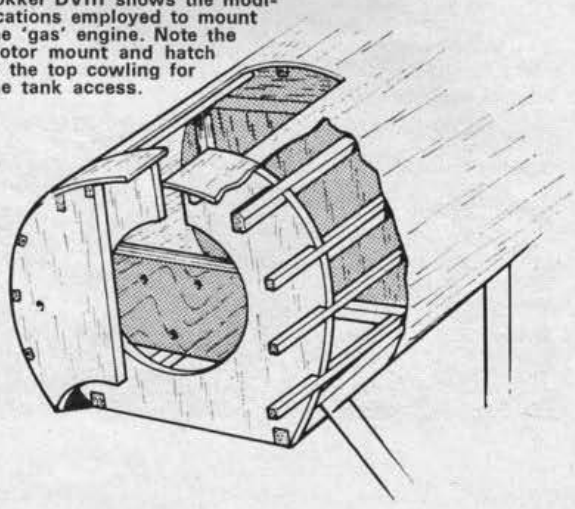
The filler valve/jet nozzle is plugged into the loader and the tank filled as normal. When the knurled part on the loader is slid forward the valve/nozzle is released and the escaping CO_2 provides the thrust. To test this I attached the unit to a small chuck glider and it works well. However, it obviously needs a specially designed, swept wing glider which utilises the tank as nose weight for optimum performance. Flights of over 30 seconds from the 5 second thrust are claimed.

The first problem was to obtain suitable CO_2 cartridges. The normal cartridges available here (in Germany) did not fit, the neck diameter was too big. English ones fit but I thought them all rather expensive and the cheapest were eventually found in a gun shop. They are used for CO_2 powered guns and may not be available in the U.K., or if they are, they may not be any cheaper. I immediately tested the motor and was amazed at the power available, but found, particularly with larger propellers, a powerful torque reaction.

The motor is intended to be mounted radially with three screws or bolts. I chose screws for ease and safety but found the smallest I could obtain, ¼ in. X O roundhead were still too big for the mounting holes. I very carefully drilled out these holes until the screws just fitted and have found this an excellent method of mounting the motor.

Attention was now paid to completing the models. The Auster was obviously the best type of model for first tests but unfortunately I chose the Nieuport! The first problem was how to mount the motor unit for easy removal. I think the whole point with

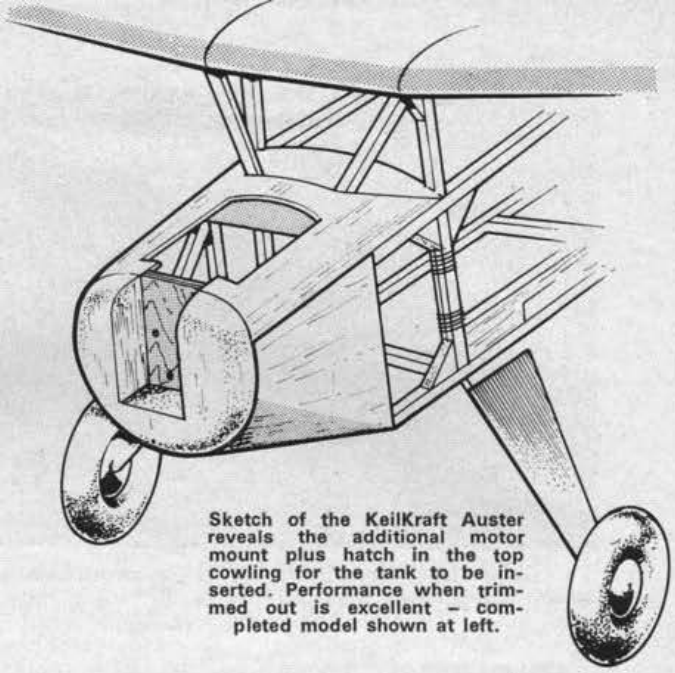
Pictorial sketch of the KeilKraft Fokker DVIII shows the modifications employed to mount the 'gas' engine. Note the motor mount and hatch in the top cowling for the tank access.



this miniature system is that models can be built at a very low cost so therefore my first consideration was that I must be able to remove the unit easily and quickly and transfer it to another machine. The Nieuport was the easiest to modify and was soon ready to fly. No alterations had been made other than the addition of a 2 mm. ply bulkhead on which to mount the motor. After some initial fast test glides it was apparent that the airframe was in for some shocks that it just was not designed for! At just over 2 oz. weight and with only 16 in. span the wing loading was rather high. The motor gave ample power but under power the model was very sensitive to trim. A violent left turn under power could not be completely cured, even with as much offset as I could give, plus the rudder trim tab. All my efforts to trim failed and the model was written off when the undercarriage and wings were swept off in a particularly heavy landing. Had I kept this model, until I had learned a little more about the motor in a more stable model, I am sure that I could have made it fly well.

However, work was now started on the Auster. Firstly the undercarriage and wing mountings were strengthened and the floor and wing centre section covered with $\frac{1}{32}$ in. balsa.

A 2 mm. ply bulkhead was fitted to mount the motor, in such a position that the original thrust line was retained, and the nose in front of this bulkhead was covered with soft block balsa. A rudder trim tab was fitted and the model was now ready to fly. With a span of $21\frac{1}{2}$ in. and a weight of less than 2 oz. the glide was good and improved further when a small amount of weight was used in the tail to get the correct balance. Under power the model showed the same, although less violent, tendency to turn left and stalled under power. With the addition of offset and downthrust the model was soon flying well – so well that after nearly losing it I quickly put my name on it! Long flights are regular and follow an interesting pattern. When launched, the

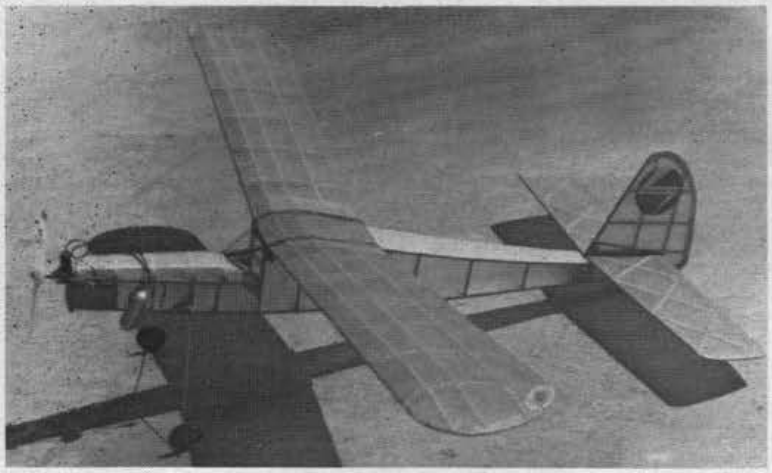


Sketch of the KeilKraft Auster reveals the additional motor mount plus hatch in the top cowling for the tank to be inserted. Performance when trimmed out is excellent – completed model shown at left.

model climbs away to the left, as the power decreases the model straightens out and finally, when the motor is just ticking over, it obeys the rudder trim tab and turns to the right until landing. I have completed two further models, a *Lindoe* Hurricane and a *KeilKraft Flying Scale* Fokker DVIII. With these I built in 5 deg. downthrust and allowed for offset to be added. The motor was easily fitted into the Hurricane by inserting the usual bulkhead but the wing roots needed considerable strengthening. At around $2\frac{1}{2}$ oz. the model flies well but again needs careful trimming to avoid the fatal left turn. The last model, the Fokker, is my favourite so far. The motor is completely hidden under the cowling yet easily removable. All struts and the undercarriage are glued with epoxy and the $\frac{1}{32}$ in. balsa floor and wing centre section added. At just over 2 oz. and only 16 in. span the glide and powered flight are fast. Again considerable downthrust and offset are needed and these are helped by rudder and elevator trim tabs. This model performs best in wind while the lighter Auster prefers calmer conditions.

What next? Well I have several more scale kits from *Veron* and *Sterling* that I would like to try besides the *KeilKraft* ones, and the Doug McHard mini-scale models would be ideal. I have already started a KK Pixie, this semi-scale model has a span of 23 in. and features knock-off wings, it should be a good performer. Then why not break away from scale altogether and modify a rubber duration model or even design a special duration job? The feasibility of this is proved by a letter from an American reader. He has used a standard *Perform-*

Already a popular conversion to electric r.t.p. operation, the Lindoe Hurricane is easily converted to take the Brown Junior, but like all low wing free-flight models, is rather trickier to trim. Although the model will fly with the prop shown, best results are obtained from the $5\frac{1}{2}$ in. propeller supplied.



The Performance Kits' Kingfisher as flown by American Bob Leisser. The engine is simply bolted to a piece of $\frac{1}{8}$ in. ply and this mount is then held place by rubber bands. Model weighs 2 oz. complete and flies on a Topflite $5\frac{1}{2}$ in. x 4 in. propeller. On a warm day (70°F.) the power run lasts for around 45 seconds when the flight pattern is three large, climbing circles under maximum power of the first half of the run – then, as the power fades, it goes into a 'cruise flight' and finally 'comes in' on the last few turns left from the tank of CO_2. One large cartridge provides about six such flights.

ance Kits' Kingfisher rubber duration model. The motor is bolted to a piece of $\frac{1}{8}$ in. ply using brass bolts obtained from a model railway supply source. The ply mount is then held on to the front of the model, in place of the normal nose block, by rubber bands. The tank is merely held against the outside of the fuselage by another band. The weight is only 2 oz. and he uses a $5\frac{1}{4}$ in. Top Flite prop. An interesting point is that on a warm day, about 70 deg. he obtains a 45 second motor run and reports that the model flies well. A scaled down $\frac{1}{2}$A power model would, I am sure, fly very well, or the motor could be used in a glider power pod for say a 30 in. to 40 in. lightweight glider.

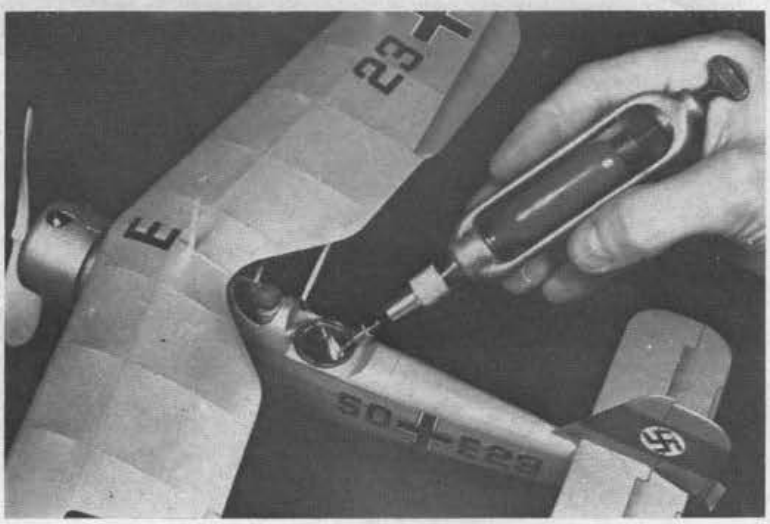
Certainly there is plenty of room for experimenting with this motor. If one could afford it a twin-engined model would be very impressive. With both motors using the same supply tank, or tanks, their power could be easily synchronised and they would stop at the same time. An R/C model would be quite feasible if one could get the RX, batteries and escapement for an all up weight of $1\frac{1}{2}$ oz., and it could be flown indoors. (Actually, it's already been done . . . the new *Radio Control Manual No. 4* will carry an article on this very subject by the late Howard McEntee – Ed.).

I have used around 30 CO_2 cartridges, obtaining 6 to 8 runs per cartridge and have had only one repair to make. The copper fuel pipe fractured where I had been constantly changing the motor from model to model! I had obtained 3 ft. (minimum quantity) of spare pipe from Brown Junior and in half an hour had completely replaced all the pipe. I have now obtained a second Load-n-Launch gun but not as a spare. As the CO_2 in the cartridge is used up the motor duration gets shorter, so unless one needs only a short run for tests, there is a temptation to release the remaining gas and fit a new cartridge. With a second gun when the motor duration becomes too short one can fill with the low cartridge then top up with the new one. In this way precious CO_2 is not wasted.

To sum up, Mr. Brown has really produced a superb little motor which has many advantages to offer: light weight, instant starting, quiet, clean operation, etc., but has one big disadvantage, its price. It is not a motor for the novice and models built for it need very careful trimming. It is certainly advisable to start with a rubber duration type model before attempting a maximum weight minimum area scale model. I should have known better myself! It has taken Bill Brown since July, 1969, to perfect this motor and bring it into production, they have only been available a short while. I have number 279 so they are certainly selling, perhaps a big enough demand could eventually reduce the price and make importing them into the U.K. a practical proposition. I hope so, then you can all have a chance to experience, as Mr. Brown puts it, 'new modelling adventures'.

These CO_2 engines are not available at present in this country, but may be obtained direct from the manufacturers: **Brown Junior Motors, Inc. P.O. Box 77, Pine Grove Mills, PA 16868, U.S.A.**

Prices are as follows: *Brown Junior* .005 *cu. in.* Co_2 engine with *standard tank, filter valve* and $3\frac{1}{2}$ *in. dia. propeller* – $24.95; *Load-n-Launch* gun – $5.95; *Micro-jet* – $2.95.



Charging a cylinder from the CO_2 cartridge in a 'Load-n-launch' gun takes a fraction of a second for the gas pressures to balance but the manner in which the charge is made influences the power duration as Doug McHard had discovered. Here is Doug's Heinkel He 46 (April 70 issue carried plans) converted from rubber to Brown Jr. power. The conversion is lighter than the original! Doug's findings will be covered in detail in the next Aeromodeller Annual. He has so extended power duration and utilisation of CO_2 cartridges to the stage where this becomes the cheapest form of power model flying by a wide margin. Propeller research is currently in hand. Though the cost of the initial unit is relatively high, the long term operational cost is low and the satisfaction of 'silent' power immeasurable.

READERS' LETTERS

Dear Sir,

The article by Mr. Midson on *Hot Air Balloons* (February 1972 *Aero Modeller*) greatly interested me because some years ago I was heavily involved with other members of Arbroath Model Aero Club in making and flying balloons of this type, and I would like to add a few comments gleaned from considerable experience in this type of flying.

First, although Mr. Midson does draw attention to the fire danger, I do not think that he fully appreciates the extent of the danger, and I do consider that the balloon design accompanying his article is of a very dangerous type. In fact, NO BALLOON WHICH CARRIES A BURNER of any type should be flown, as there is no means of being certain that the flame will be extinguished before touch down. Furthermore, hot air balloons can travel long distances and very quickly go out of sight, and a serious fire could be started and out of control before anyone became aware of it.

These observations may lead one to think that a hot-air balloon without a built-in source of heat is a complete non-starter, but not so. The answer is to heat the balloon *before* it leaves the ground.

We found that the best heater is a very simple one indeed. All you need is (1) an old bucket with the bottom knocked out of it, (2) a small receptacle such as a shallow tin, or a saucer, (3) some paraffin, and (4) some cotton waste.

The method is to pour some paraffin into the shallow tin or saucer, add a piece of cotton waste or any suitable material to aid ignition (not always easy on a breezy day). When the paraffin starts to burn, place the bottomless bucket upside down over it. This makes a suitable funnel. Then the mouth of the opened-out balloon is held over the bucket (this requires two or three people). In a couple of minutes or so the balloon will be hot enough to be released and it should ascend to a height of two or three hundred feet, and then float downwind quite far enough to satisfy anyone.

This type of balloon, it will be appreciated, is quite free of any fire danger at touch down. Make sure, however, that the bucket-furnace is set on a place that will not ignite.

We found that the larger the balloon the better it flew. About six feet diameter is an ideal practical size.

Arbroath, Angus D. D. Edward

Dear Sir,

I would like to say how much I enjoyed reading Eric Coate's series of articles on scale models for free-flight power.

The series is well-timed because of the tremendous advances made over the past few years in building techniques, due no doubt to the wider range of materials and adhesives available to the modeller. Eric has satisfied a long-felt need in the scale flying sphere and I should think that a reprint of his series under one cover would find lots of buyers.

I have been a 'loner' since 1939 and have only ever built scale models – in those days MEGOW models of about 14 in. to 16 in. span, rubber driven at 9d each including coloured tissue, wire, rubber, hardwood wheels, balsa prop, etc., and not forgetting the diminutive tube of cement. Another but more expensive series of kits were COMET models, who produced a glorious catalogue of their range, which included a Hawker Hind super detailed kit exhibition model which even had grey silk supplied in the box, for rigging. This kit was an astronomic 11/-, but was really mouth-watering, and the contents included black and silver dope, silver tissue, etc., and sheet after sheet of printed balsa. The amount of detail on the plans in this series was extensive and whilst the flyability of the models was average, the visual impact was outstanding. A model of exhibition standards was assured with the materials provided.

From 1942 onwards, I flew with the RAF as a pilot on Beaufighters and Mosquito aircraft in the Middle and Far East; and I remember when the squadron was at St. Thomas' Mount aerodrome, just outside Madras, there was, in the maintenance unit, some wood from a 'mossie' fuselage which I fell upon for model making.

This wood was, of course, slightly curved throughout its length and was not easy to transform into a usable format; however, in times of need, etc., etc. The adhesive I used was the same as for the real thing, i.e. Casein cement filched from the M.U. in powder form, mixed with cold water. Covering material was toilet paper – the smooth variety which was in sheets about 6 in. x 4 in., buff coloured and semi-transparent. This meant that the model was covered in dozens of pieces of tissue and indeed the designer had to take serious account of the size of the 'bog paper'.

I seem to remember that the tissue was water-shrunk and then doped with a home-made brew of thinners with celluloid dissolved in it.

I personally stuck to gliders at this time because elastic was impossible to get, except in the form of 'bungee', which was used in short lengths on the parachute to open the 'pilot' chute. Wing and tail fixings I remember were by tongue and box with matchstick shear pins or by wire dowels fitting into rolled paper tubes. The models always finished up rather on the heavy side and even with all the heat, the performance was pretty terrible.

The photo on Page 19, January issue, of the Sopwith Pup just getting away is in fact my model built from APS plan 1 in.=1 ft. and at that time was a year old. I have since given the model away and have built the 1½ in= 1 ft. Sopwith Pup using lightweight nylon on the framework and a reworked aluminium saucepan for the cowling. This model flies extremely well and is very stable – I have not fitted a pendulum as I do not believe they have a practical application in model aircraft. If a model is basically that unstable, then one must seek solutions outside pendulums.

Boreham Wood, Herts. H. E. Fairhead

Dear Sir,

The redoubled efforts which have been made in recent issues of *Aeromodeller* to attract more entries in control-line stunt have reminded me of a comment by Noël Falconer back in 1964. His concern was the tendency of stunters to increase in size as larger engines became available for R/C, but I think his solution still has a great deal of relevance today.

He proposed a 'Formula 2' stunt class, with a capacity limit of 1.5 c.c. and maximum line length of 50 feet, as I recall. As a would-be stunt entrant myself, I am very much inclined to press for such a class, but with certain minor modifications. I have in mind a simplified schedule, cutting out the square eights and hourglass, for example, so that the class would have no relevance for the expert but would attract only the novices and those who lack the self-confidence to compete in 'real' contests.

I think 1.5 c.c. is too small and would suggest 2.5 c.c. as a top limit. This should offer reasonable stability in wind whilst retaining the virtues of cheapness and portability. I don't think there's any point in restricting line length; this is self-limiting anyway, and nobody's likely to go much above 55 ft. for 2.5 c.c. powered models.

Our local band of enthusiasts – soon, I hope, to become a real club – are moving on to these medium-sized engines and maybe we shall be able to work out some rules in practice. Then we'll know if the idea is workable.

Meanwhile, any takers?

Farnham, Surrey. J. L. Park

Dear Sir,

Thank you for publishing my letter re glass-fibre props in the January '72 issue.

It appears that in asking for some research into the fatigue of glass-fibre I have stirred up a hornet's nest. Your correspondent for Control Line matters gave a very clear reply, stating 'we would find the glass-fibre item safer *provided* it is properly made', although the accompanying photo suggests that glass-fibre props may be 'harder than steel'.

With regards to Mr. McCann's letter, please note that I asked for 'some careful looking into the issue' and I did not suggest that I, or the Society, should dictate to Mr. McCann on what sort of material his props should be made of. The Society however, already does – metal props must not be used.

Many people can tell us about metal fatigue, but how many know about fatigue in glass-fibre – I certainly do not. Do Messrs. J. Bartels have any information about the effect of fatigue in glass-fibre propellers – or any other manufacturer on the fatigue of glass-fibre in general?

In answer to Mr. McCann's query, I have served on all the committee posts of Anglia M.F.C. (as Secretary I increased club membership from 11 to 83) and at present I am producing the club newsletter. I am also on the East Anglian Area committee and last year I was on the S.M.A.E. F/F subcommittee.

Over the last fifteen years I have flown:

C/L stunt combat, team race, rat race and speed (admittedly without much success).

Multi R/C sport & aerobatics (until funds ran out).

At present I am flying F/F A/2 and 1/2A and I am building two Wakefields. I have also flown Open Power (ETA15) in a very severe snowstorm.

As for props – I usually use wood or nylon which are frequently replaced.

But Mr. McCann, if I were to fly F.A.I. Power I would certainly use a glass-fibre prop of good manufacture and accept the risk; unless you suggest that the S.M.A.E./F.A.I. rescind their rules to allow the use of metal props.

Chelmsford, Essex. D. H. Stapleton

FREE FLIGHT COMMENT

by John O'Donnell

Dave Yates with his very conventional-appearing A/2 glider, complete with glass-fibre fuselage. It produced five maxs and a respectable fly-off time in the Spanish A/2 postal event last April. Dave ran the Wigan Chuck Glider event.

OVER THE YEARS the S.M.A.E. Contest Programme has evolved until it seemed to have reached a comparatively stable state – major innovations were a rariety, and one year's calendar looked much the same as its predecessor. With this background, the schedule for 1972 (given in detail on p. 108 last month) is most unusual in having a number of new ideas.

So far, practically all the discussion and controversy has revolved around a single item – the decision to 'split' the Nationals, and hold the free-flight events separately from the other classes. Editorial doubts have been expressed in this magazine as to whether the Nationals atmosphere will survive. Certainly in the past the 'Nats' have become the Mecca for the one-event-a-year modeller who wants to see a lot of activity and a variety of models. Free-flight is terribly vulnerable in this respect, as it lacks spectator appeal and hence is liable to be first to feel the pinch of reduced attendance and appeal. Public attendance is another factor that must affect the status of the meeting.

There are many hardened contest enthusiasts who have decried the Nats for its 'garden party' air, and argued in favour of a 'serious' competition. Be this as it may, the Nats had that elusive prestige that other S.M.A.E. events lacked. It remains to be seen whether the new arrangements will retain this degree of acceptance – or whether it will degenerate into being just 'another' competition. I for one am convinced that attempts to recover from the present-day D.I.Y. informality, by providing an event that is visibly important to all concerned, would be amply rewarded. An excellent start in this direction could be made by arranging for awards, even prizes, to be given out at the end of the meeting.

Other changes in the (free-flight) Nationals have received little publicity, and indeed were only apparent as a *fait accompli* when the Contest Programme was published. Flying now extends over *three* days, commencing early in the afternoon of Saturday 27th May. Furthermore, events have been redistributed so that the three F.A.I. categories are spread over Saturday and Sunday. This allows for these events to be flown in a leisurely fashion, in sequence and in rounds – and even gives time for a lunch break.

The contrast between this, and Monday's schedule is too marked to be accidental. The third day of the Nationals has the three open events (rubber, power, glider), plus five other classes, all crowded together. Catering for the numerous fly-offs means that they start early – with casual disregard for previous attempts to stage meaningful evening fly-offs.

I can see no convincing reason why some of Monday's events should not have been held simultaneously with the F.A.I. classes. It would be far easier for a competitor to make 'open' flights between the well-spaced rounds of his F.A.I. speciality than to fly several events on the last day. From what I hear, the Nationals timetable was rediscussed at the S.M.A.E. Council Meeting on January 16th – but only one minor alteration was made – this was the addition of chuck glider to the list of *Monday's* events!

Before leaving the subject of the Nationals, its venue should not go unmentioned. R.A.F. Strubby is at present just a name to the modelling movement. Advance description in Ron Firth's 'M.A.G.' is that *the 'drome is big, measuring two miles by one mile within the airfield boundary. The outside country is flat and there is good recovery in almost all directions.* This sounds marvellous and the venue will certainly bring a most welcome and long overdue move away from the S.W. corner of England. Finally, the inclusion of R/C Thermal Soaring in the F/F Nationals has interesting implications – but ones that will have to be discussed on another occasion.

There are several other innovations in the Programme. A new meeting has been introduced early in the season and takes the form of a two-day centralised F.A.I. contest to be held at Syerston over the Easter weekend. Flying is scheduled for the Saturday and Sunday which hardly makes the best use of the long Bank Holiday weekend! Apart from being a contest in its own right (and carrying the trophies formally used for the World Championship Trials), the meeting will serve to select a team for the European Championships from amongst those who wish to go.

The Trials proper are scheduled to be held over a couple of weekends late in the season – as has been customary for some time now. However instead of holding the events in a rubber/glider/power sequence, there has been a separation of events. A/2 glider is to be flown on the two Saturdays concerned, whilst Wakefield and Power share the two Sundays. This scheme will enable the one-event specialist to attend for only the one day involved – and many will doubtless take advantage of this opportunity. Repercussions can be expected and are sure to include a timekeeper shortage in A/2.

By now it will be apparent that much of the S.M.A.E. Contest calendar is slanted to suit the F.A.I. enthusiast - and that I have reservations about this. There are perennial cries that we must improve our flying standards with the object of doing better in the International events. Many fliers go so far as to suggest that the National contest programme should go all-F.A.I. so as to 'force' fliers to concentrate on the 'specification' events. Some European countries have taken this approach, and their high standards are often quoted as an example. There is less mention of the price paid, however – the very modest number of fliers actually involved. Open events in England still interest a considerable number of regular contest enthusiasts, who are hardly likely to be converted to F.A.I. by having their current interests over-ridden. International prestige *is* important, but a strong and active F/F movement at home is much more so.

As always at this time, I wonder about the wisdom of selecting our World Championship representatives the year before the event. The theory is simple – it gives the people involved time to build and develop models for the Championships. It also 'cramps their style' in the normal round of contests prior to the Champs, and gives them time to go'off form'. Contests, even World Championships, involve much more than sheer performance – and the modern tactical approach has emphasised the distinction. What is needed is to

have *everything* right 'on the day', and this means the flier even more than his models.

On this topic, let me quote Paul Lagan in **South Island News** (New Zealand): *"To the European modeller the World Champs is just another contest! He appears to make no 'special' preparations and certainly makes no new 'world beaters' for the Champs . . . on the other hand, teams that 'travel' to the Champs viz U.S.A. . . . Gt. Britain . . ." etc tend to overprepare themselves* and much, much more in the same vein.

* * *

A year ago the F.A.I. imposed a four-year freeze upon World Championship specifications and contest regulations. In consequence there was little in the way of real surprises from the C.I.A.M. Meeting early in December in Paris.

The one decision that affects models directly could be described as a shock rather than a surprise. As mentioned in last month's *Hangar Doors*, the all-up-weight for Coupe d'Hiver models has been increased from 80 to 100 grammes (i.e. from 2.82 to 3.52 ozs). This was agreed by an overwhelming majority, all presumably convinced that the reasons advocated for the change were valid. The proposal was made and passed on the premises that present day Coupe d'Hiver models can easily exceed two minutes, and that many modellers cannot build them down to weight!

Whilst it was a French speciality, Coupe d'Hiver rules remained the same for over 20 years. Once adopted by the F.A.I., the changes began – five flights, hand launch, and now a weight increase. Paradoxically it was *France* who proposed the 100 gramme idea.

Less controversial is the decision to allow reigning World Champions to defend their titles – even if not part of their countries' team. A variety of purely practical matters were also debated. Starting in January 1972 the usual launching area was to be replaced by a line with competitors having to launch from marked points thereupon. A 'working definition' of these points has been agreed as being a circle of approximately 5 metres radius. This will produce the desired effect of spreading out the fliers without having them worry about being disqualified for moving a few paces at the moment of launch. A clear space for flying will be ensured by having spectators at least 25 metres from the basic starting line.

Tactical flying introduced many side effects into the glider event. Collisions and line tangles are now frequent, and need watching by the timekeepers as a reflight might be appropriate. A purely practical answer has been found in having one timer start two watches when the model is released, whilst his companion looks for line tangles or thrown winches. With the flight safely underway the first timer gives one of the watches to the other timer, and normal timekeeping is carried out. Having seen the dangers of models being towed into the ground by a flier reluctant to lose a flight by releasing his winch, the situation has been alieviated. Release of the towline itself is now once again permitted. This implies disconnectng it from the winch which is *not* allowed to be thrown. Another sensible change is to impound towlines after each flight, rather than recheck them before the next.

Longer term ideas concerned mainly the power class. There was much support for a reduced engine run of 7 or 8 seconds, but this cannot be introduced at present. Logically enough it was recommended that such runs be tried out by interested countries and results reported. The needs for ways and means of reducing performance and *hazards* of power (and other) models were referred back to the C.I.A.M. free-flight sub-committee. Despite these items and the approving in principle of a set of 'Safety Rules, the subject of glass-fibre propellors does not seem to have arisen. The last two issues of *Aeromodeller* have contained much comment on the dangers or otherwise of this type of propellor. The aspect that does not seem to have been raised is that G.F. propellors offer one of the few ways in which an individual can produce his *own* propellors and hence try to develop this sadly neglected aspect of power flying.

I can only endorse the view that the most risk of injury is to the model flier himself. There is no real need to use one's fingers to flick the propellor and certainly no need to leave them unprotected. As many high revving glow motors have little compression, the mechanical or electric engine-starter has a very useful place in the F.A.I. power scene. In short whilst I will not deny that safety is very important, there is such a thing as buying too much life insurance.

* * *

In contrast to the three meetings described in last month's article, more recent contests have been held under perfectly conventional rules. The holding of outdoor flying meetings in winter in England is a risky business – although some would say the same applies to the so-called Summer. This is not to say that good weather does not exist – it is just impossible to predict.

Urlan Wannop, shown here at the '71 Nats fly-off, won the rubber event at the Falcons Gala with the same design. Lightweight machine has a good glide but tends to be tricky under power.

The **Falcons Gala**, held at R.A.F. Chetwynd on December 5th was more than lucky with the weather. This was a mild, very calm and overcast day, with remarkably little thermal activity. In short it was an ideal flying day, a fact that all attenders obviously appreciated and for which the organisers claimed the credit!

Scarcity of lift is best illustrated by the glider scores. There were but half a dozen maxs recorded in the whole event – and two of these came from the winner. This was Charlie Wyatt of Ashton with a model perfectly suited to the conditions. It was a nine-foot span lightweight designed many years ago by Ian Ellison. Whilst hardly up-to-date, with a short moment arm and large tailplane, its performance lacked nothing. Runner up was P. Scrivens of Cheltenham, closely followed by Urlan Wannop. As I was fourth, perhaps I shouldn't have suggested at an earlier contest that Urlan alter the wing warps of his A/2!

Chuck glider results also reflect the day's conditions. The use of a launching box did not stop people from trying to pick the 'moment' – but no-one managed to clear the minute! Top scores were very close with Barry Kershaw filling top position. He deserted his usual glass fibre rod design to fly a Roy Roberts modification of the Dick Mathis *Flash* design. To confuse the issue, second place went to Ian Allen using Kershaw's design built as per the drawing in *The Message*. Third was decided by a fly-off – with Eric Higham edging out Roy Roberts.

Naturally enough the Open Rubber and Power events were fly-off contests with nine and six participants respectively. Rubber was the first to be held and there was little hesitation from those involved. Scores seem to indicate that some models do not have the performance that their owners would like. The only competitor to find any real help from the air was Urlan Wannop whose model recovered from an initial

Ian Allen takes a run-up before launching his chuck glider at the Wigan meeting. One way to keep warm on a cold day!

Dave Barnes (left) added another contest success to his list by becoming top Junior at the Wigan 'Chukkie' contest, which was won overall by John Boon, seen at right.

power stall but glided extremely well from moderate height. The model was lightly loaded (with 3 oz. structure weight and rather less than that amount of rubber) and had been giving trouble during the day with little margin between stalling and spiraling under power.

Onlookers were quick to tell me that my *Maxine* was in 'definite lift' – but it only just cleared seven minutes on a straightforward up-and-down flight for second. John Carter managed third place with his usual 300 sq. in. model that makes up for moderate height with a very good glide. On the fly-off his model glided almost straight, and came back over the timekeeper's head at about four minutes!

Power was much less spread out. There was less than 50 seconds between all the fly-offs – including that of Roger Baggot who dropped out with a fractional over-run with his ETA29 model. Winner proved to be Dave Pymm, back in Walsall after three years in Canada. He was using a 17 oz. Open model on the lines of Ray Monk's designs but with *Night Train* airfoil and G15 power. A similar motor-powered 'Perc' Perry's second place model – which he described as a 'lash-up' using F.A.I. wings and tail – but well under F.A.I. weight. Russell Peers placed third with one of his ETA29 *Woodpeckers* – just three seconds above my OS35 powered model. As the organising club were not taking their own prizes this put me 'in the money'.

Prizes were quite high by modern standards – due to being financed by a matching entry fee of 25p per event. This charge is rapidly becoming standard and is a good example of the inflationary spiral. Finally mention must be made of the junior prize – standard practice in the N.W. – taken on this occasion by Keith Lord of Syke.

Results

WIGAN WINTER CHUCK GLIDER CONTEST
Beacon Park, Upholland, December 19th, 1971
Chuck Glider *(32 entries)* 1. John Boon (Falcons) 3:58; 2. B. Kershaw (Wigan) 3:46; 3. M. Duce (Liverpool) 3:33; 4 & Top Jnr. D. Barnes (Liverpool) 3:31; 2nd Jnr. M. Gleeson (Syke) 2:51.

CHOBHAM RALLY
Chobham Common, December 27th, 1971 *(32 entries)* 1. J. Punter (Hayes) 8:56; 2. J. O'Donnell (Whitefield) 8:02; 3. C. James (Hayes) 7:50. **Open Power** *(16 entries)* 1. J. West (Brighton) M + 5:11; 2. M. Keevil (North Surrey) M + 4:16; 3. N. Clark (Richmond) 8:52. **Coupe d'Hiver** *(14 entries)* 1. M. Fantham (Richmond) 6:00; 2. P. Coghlan (Havering) 5:50; 3. J. C. Wright (St. Albans) 5:19.

CONTEST CALENDAR

March 5th — **CROOKHAM SPRING GALA.** Open R/G/P, C. d'H., ½A Power, A/1, Chuck, Best Junior performance. 10 a.m. start. Venue Chobham Common.

March 19th — **S.M.A.E. CONTROL LINE MEET.** Stunt, Class 'β' T/R, Combat, H'cap Speed, at R.A.F. North Luffenham, Rutland.

March 19th — **S.M.A.E. 1st AERA CENTRALISED MEET.** Open R/P, F.A.I. Glider. Area Venues.

April 1st/2nd — **S.M.A.E. CENTRALISED F.A.I. MEET** (including Trials for European Championships) F.A.I., Rubber, Power, Glider. Venue R.A.F. Syerston, nr. Newark, Notts.

April 2nd — **S.M.A.E. R/C MEET.** Aerobatics (F.A.I.) at R.A.F. Cottesmore, Rutland.

April 2nd — **ELLIOTT SPEED MEETING.** Classes 1.5, 2.5 (Open & F.A.I.), 29, 40 and 60. Note .40 class to use 60 ft. lines. Venue Elliott Bros., Airport Works, Rochester, Kent.

April 9th — **S.M.A.E. R/C MEET.** Pylon Racing to F.A.I. and F.1 rules. Venue North Luffenham, nr. Oakham, Rutland.

April 23rd — **S.M.A.E. 2nd AREA CENTRALISED MEET.** Open R/G, F.A.I. Power. Area Venues.

April 30th — **LUTON & DISTRICT SLOPE SOARING RALLY.** R/C Multi and single channel, R/C Ladies event. Also F/F Chuck Glider/Magnet if conditions and demand permits. Superhet only. Pre-entry (30p multi, 20p S/C and Ladies) to T. R. Clark, 'Windyridge', 126 Alexandra Avenue, Luton, Beds (Luton 22742). Venue Ivinghoe Beacon.

May 7th — **STAFFORD HURRICANES SCALE R/C AIR DAY.** Class II rules. 10.30 a.m. start. 25p pre-entry/details from D. Martin, The Laurels, 58 Mount Road, Stone, Staffs. Venue Hixon Airfield, 4 miles east of Stafford on A51.

May 7th — **WOLVES M.A.C. C/L FLY-IN.** Aerobatics, Scale Fly-for-fun (most entertaining flight wins). Short grass surface, silencers and insurance essential. Details W. Hatfield, 563 Stafford Road, Wolverhampton WV10 6QE. Venue Lucas Aerospace Ltd., Hobson Works Sportsfield, Fordhouses, Wolverhampton.

May 27/29th — **BRITISH NATIONALS:** R/C, C/L, F/F, Scale at R.A.F. Hullavington, Wilts. F/F & R/C Thermal Soaring at R.A.F. Strubby, Lincs.

June 4th — **ELLIOTT ANNUAL CONTROL LINE GALA.** Stunt, Combat, Goodyear at Elliott Bros., Airport Works, Rochester, Kent.

June 11th — **S.M.A.E. 3rd AREA CENTRALISED MEET.** Open G/P, F.A.I., Rubber. Area Venues.

June 11th — **S.M.A.E. R/C MEET.** Aerobatics (F.A.I.) at R.A.F. Cottesmore, Rutland.

June 18th — **AEROMODELLER/SCALE MODELS/R.C.M. &E. ALL SCALE RALLY** at Old Warden, Biggleswade, Beds.

June 18th — **SOUTHAMPTON M.A.C.'s F/F GALA.** Open R/G/P, Chuck, Combined mini-comp. Venue Beaulieu Airfield, 10.30 a.m. start.

June 25th — **S.M.A.E. SCALE TEAM TRIALS** for 1972 World Championships. R/C & C/L at R.A.F. Cottesmore, Rutland.

July 2nd — **S.M.A.E. R/C MEET.** Pylon Racing to F.A.I. and F.1 rules at R.A.F. North Luffenham, nr. Oakham, Rutland.

July 9th — **S.M.A.E. R/C MEET.** Aerobatics (F.A.I.). Venue to be announced.

July 9th — **S.M.A.E. 4th AREA CENTRALISED MEET.** Team Glider, F.A.I., Power, C. d'H. Area Venues.

Peter Chinn's latest engine news

Top picture shows pre-production version of a possible successor to the Taipan 2.5-BB Series 70. Several internal changes include a new scavenging system. Below is the Series 70 Taipan 2.5-BB. This engine has a ball-bearing shaft but porting is similar to that of the Tyro.

Taipan 'Tyro' Diesel

Good news for all those dads whose fondest memory of balmy (?) bachelor days is of the pursuit (circa 1949) of an Elfin 1.8 powered free-flight or of performing their first wingover with a control-line model similarly urged on by that lusty little motor from Liverpool.

Admittedly, Gordon Burford's Taipan Tyro doesn't look much like an Elfin (even though its earliest ancestor, G.B.'s Sabre of more than 20 years ago was, we suspect, Elfin-inspired) but it *is* a 1.8 c.c. diesel – 1.85 c.c. to be more precise – and it has the Elfin willingness to lug a big prop as well as to effortlessly spin a small one.

The Tyro is built in South Australia by Gordon Burford & Co. Pty. Ltd., who make a wide variety of diesel and glowplug engines from 1.5 c.c. to 10 c.c. and whose products are jointly distributed in the U.K. by Veron and by Performance Kits. Following publication of our first illustration of a Tyro in the January issue, Performance Kits informed us that they had received their first shipment of these engines from Australia and that they will retail at £6.18 each. In due course, we hope to feature the Tyro in the *Engine Test* series but, in the meantime, a brief description may be of interest.

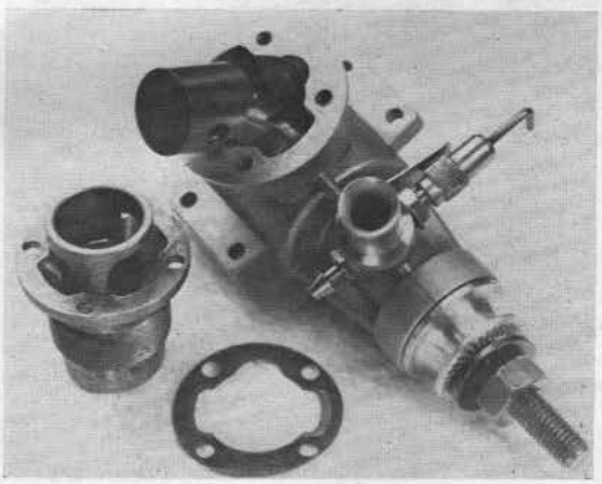
As the photos show, the Tyro is a shaft-valve variable-compression diesel of orthodox appearance. It is, however, a very solidly made engine that should be able to take more than its fair share of knocks. The crankshaft, for example, is a quite massive affair with a 13/32 in. dia. journal and runs in a bronze bearing. To reduce the risk of crash damage to shaft or crankcase, a separate replaceable prop stud is used. The cylinder is uncommon in that it is located in, and secured to, the crankcase by means of a base flange and four screws. Transfer porting is via two large inclined ports, one each side, the two exhaust ports being located fore and aft. Bore and stroke are 0.511 x 0.551 in. and the engine weighs 129 grammes or 4.55 oz.

Taipan 2.5-BB Diesels

Of similar design to the Tyro but larger and with a twin ball-bearing shaft, is the Taipan 2.5-BB 'Series 70' diesel. Actually, this preceded the Tyro and was introduced to the Australian market about 18 months ago. It employs the same scavenging system, except that the exhaust ports are located on either side and the transfers are arranged fore and aft. The whole motor is very nicely turned out, with both castings and machined parts produced to high standards of accuracy and finish.

The Taipan 2.5-BB Series 70 has a bore of 0.558 in. and a stroke of 0.620 in. giving a swept volume of 0.1516 cu. in. or 2.485 c.c. Checked weight: 189 grammes or 6.67 oz.

Recently, Gordon Burford has been developing a modified version of the 2.5-BB using a form of Schnuerle loop scavenging in place of the existing reverse-flow system. In this, the single wide exhaust port (not quite so large in area as the total of the two ports on the Series 70 engine) is located on the right and the two transfer ports flanking it are reshaped to direct gas flow towards the opposite side of the cylinder where there is a third transfer port fed from a channel milled in the crankcase wall. As a further aid to free breathing, there are cutaways



New type Taipan 2.5-BB with cylinder removed to show revised porting system using three transfer and one exhaust port on Schnuerle scavenge principle.

in the piston skirt, fore and aft, to prevent its masking the entry to the main transfer channels at BDC.

We understand that if this engine eventually replaces the existing Series 70 model, the main casting will also be modified to give a more appropriate cross-sectional shape to the transfer channels. Other modifications already incorporated include a lighter, tubular gudgeon-pin, a lightened con-rod and a lengthened intake venturi with smaller choke diameter, the latter, perhaps, in the interests of fuel economy for team-racing. The checked weight of the example examined was 186 gr. or 6.56 oz. All major dimensions remain the same as for the 2.5-BB Series 70.

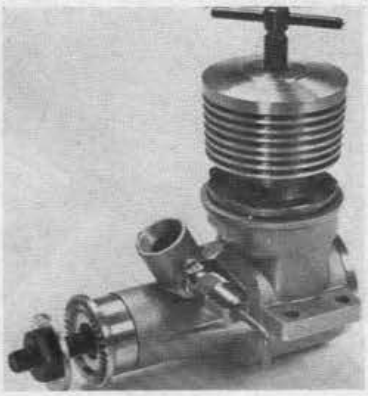
Super-Tigre G.15/19

Some months ago, the Super-Tigre factory began offering a '19' version of the standard 2.5 c.c. G.15-FI (front induction) motor. Built around the same body casting, the G.15/19 is almost identical in appearance and has exactly the same mounting dimensions: it is just a fraction taller in overall height due to a thicker cylinder-head.

A slight change has been made to the G.15-FI crankcase and is applicable to both displacements. The intake boss, formerly rectangular, has been modified to accept a normal circular section venturi insert. This facilitates easy conversion to a throttle type carburettor for radio-controlled aircraft or racing-car use. The G.15/19 is, in fact, available with a Super-Tigre Mag-III carburettor and it then becomes known as the G.15/19 R/C.

The construction of the G.15/19 closely follows that of the standard G.15-FI and as this has been deal with on previous occasions in *Aeromodeller,* it will be sufficient to remind readers that this is a finely made twin ball-bearing motor with Garofali's symmetrical open-loop scavenging system having simultaneous exhaust and transfer timing and a flat-crown deflectorless piston.

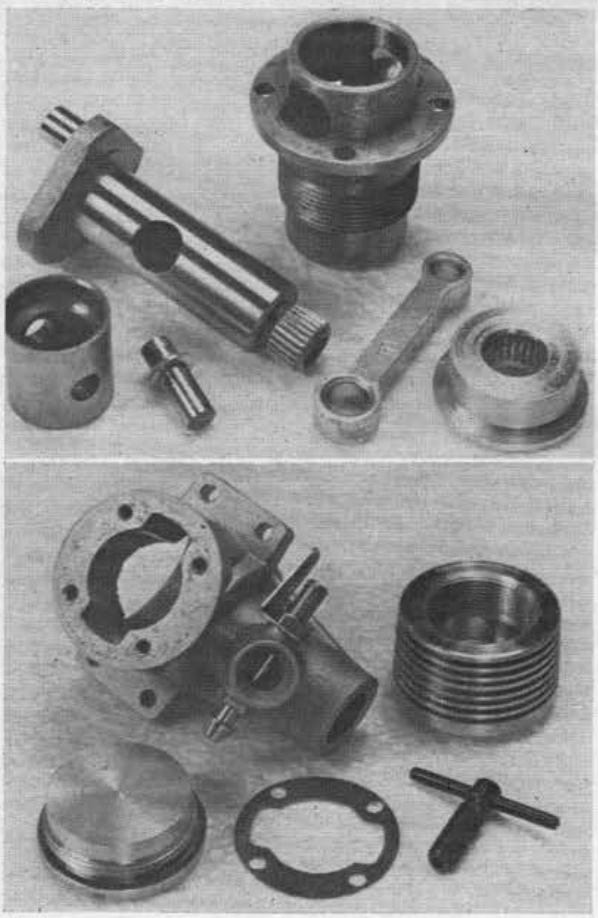
With a few minor exceptions, parts are *not* interchangeable between the 15 and 19. This is because the increase in swept volume has been obtained by both widening the bore and lengthening the stroke, thereby necessitating a new piston, cylinder, cylinder-head and crankshaft, plus modifications to the main casting. The cylinder bore has been increased by 1.0 mm. to 16 mm. and the piston stroke by 2.0 mm. to 16 mm., giving a nominal swept volume of 3.216 c.c. or 0.1962 cu. in., compared with 2.474 c.c. or 0.1510 cu. in. for the G.15-FI.



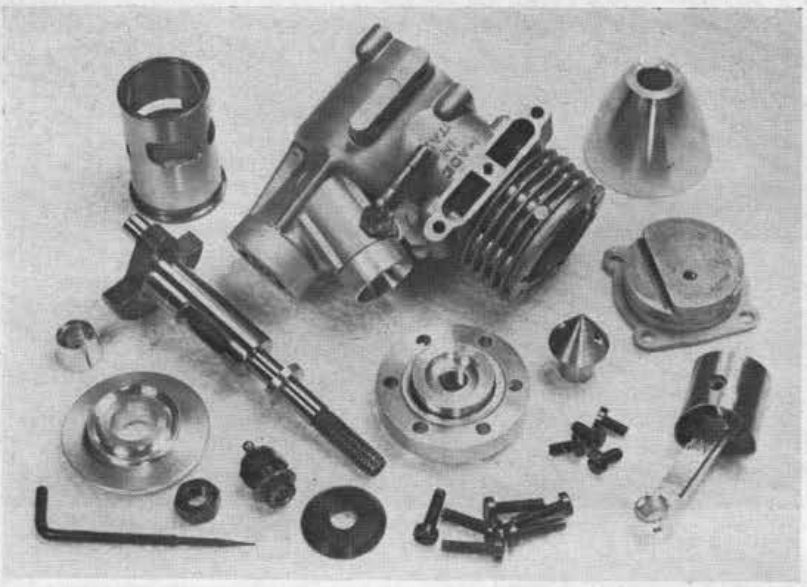
The Taipan Tyro 1.85 c.c. diesel, a robust and well made motor from Australia.

One result of the increased stroke has been to substantially lengthen the sub-piston induction period: i.e. the piston skirt now uncovers the bottom of the exhaust port for about 45 degrees of crank angle each side of top-dead-centre. This certainly does not help matters so far as the R/C version is concerned, where it must cause a loss of fuel suction through the carburettor, plus a loss of power when an expansion box type silencer is used, due to contamination of the crankcase by exhaust gas. For contest free-flight with an open exhaust, however, this condition is quite acceptable.

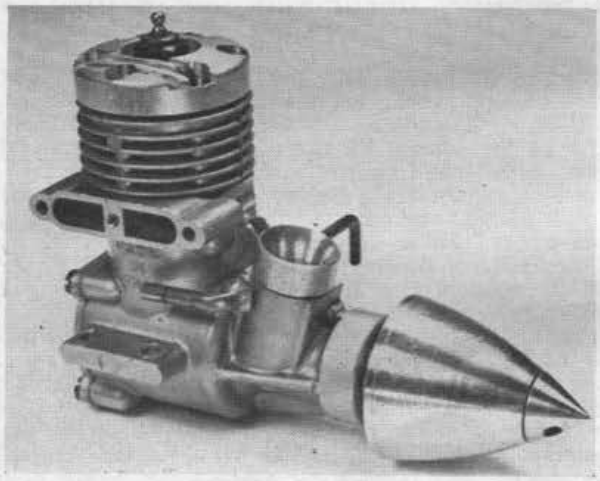
Being interchangeable, as regards mounting dimensions, etc., with the G.15-FI, the G.15/19 could be used as an alternative power-plant to the G.15-FI in an FAI model for open F/F Power contests. We have not checked the performance of the new G.15/19 against that of the G.15-FI (the example illustrated was loaned to us for examination only) but, with 30 per cent increase in displacement, it is reasonable to suppose that the 19 would offer a useful increase in power. A small c.g. readjustment would be called for on account of the 19's fractionally greater weight. Checked weight of the example submitted was 170 grammes or almost exactly 6.0 oz. against 5.77 oz. for the G.15-FI.



Parts of the Taipan Tyro. Note the very hefty crankshaft journal and the flange - fitting cylinder with its steeply inclined twin transfer ports.



Parts of the G.15/19 have the usual crisp Super-Tigre appearance. New round intake is also used by latest G.15-F1.



The recently introduced Super-Tigre G.15/19. This is basically the familiar G.15-F1 model, bored and stroked to increase swept volume by 30 per cent.

These weights include the very nice S.T. machined spinner assembly. The engine is also supplied with an optional backplate nipple for pressurising the fuel supply. A pressure system is necessary since the effective choke area of the 9 mm. i.d. venturi is some 60 sq. mm.

Good 'uns and Not-to-good 'uns

Talking of G.15's, we are reminded of an interesting letter that we received some months ago from D. E. Cowan of Cowan's Specialities, Reading, Pennsylvania, commenting on our test report on the G.15-FI in the June 1971 *Aeromodeller*. In this report, it was remarked that the engine under test fell considerably short of the performance of another G.15 tested much earlier. Mr. Cowan wrote:

'I read with interest your engine report in the June 1971 issue of Aeromodeller *which covered the S.T. G.15-FI engine . . . My own data and findings on G.15-FI engines might help to explain some of the differences in performance between your late model engine and your earlier test model. Although I am a hobby dealer, my interest in control-line Goodyear racing has prompted me to investigate the G.15-FI rather closely.*

'It has been my experience that S.T. never seem to make two runs of engines in the same way. I have observed that the clearance between the bore diameter and the head diameter can vary from approximately .0012 in. to .0027 in. between engines and especially between one run and another of G.15-FI engines. This can make a significant difference in performance, all other factors equal. A friend of mine has two of the earlier series engines with pipe type exhaust flange and nylon venturi insert. One of these engines has a head dia. clearance of only .0014 in. and the squish-band to piston clearance with gasket installed is only .003 in. This exceptional engine is entirely stock. With a Fox long-reach heavy-duty plug and RAMM speed fuel, this engine turns 17,200 r.p.m. on the bench with a 7 x 6 Tornado nylon prop. This performance is equivalent to that of an Aldrich modified engine using the Cox trumpet insert type head. The second engine has a head clearance of .0027 in. and the squish-band to piston clearance is .003 in. also. However, this engine is about 800 r.p.m. slower than the first. The chamber volumes of these two engines are .168 c.c. and .182 c.c. respectively.*

'It has been my experience that the series of G.15-FI engines from which your sample came (late model with large exhaust) are very sloppy in regard to general cylinder head fit. For example, I measured two such engines which I had in stock. These engines were well fitted in the bearings. One had a head diameter clearance of .0021 in. and squish-band to piston clearance of .014 in. with gasket in place. The second engine had clearances of .0014 and .014 respectively. The combustion chambers on these engines measured .208 c.c. and .210 c.c.'

Mr. Cowan is not far wrong in his assumption that our test motor (an early 1971 delivery) had a head diameter clearance somewhat above the ideal minimum. It was, in fact, .0021 in. The squish-band to piston clearance took a middle course at .008 in. It is only fair to point out, however, that variations in clearances such as we have mentioned are by no means confined to Super-Tigres. We have, on occasions, encountered more serious discrepancies in other makes. It is nevertheless true that, especially with small racing engines, the adherence to strict tolerances becomes increasingly important if optimum performance levels are to be maintained. This, of course, is one of the the areas where the tuning specialist first looks for a quick improvement and it is also why tests on modern off-the-shelf engines of this type do not necessarily establish which make is going to prove the most successful in competition.

*Approx. 65 per cent nitromethane, 17 per cent propylene-oxide, 18 per cent synthetic lubricant.

ARADO AR 234B BLITZ

AIRCRAFT DESCRIBED NO. 212

Germany's revolutionary jet-engined bomber, described and drawn in detail by B. Hygate

THE FIRST A-SERIES prototype of the Ar 234 flew in July 1943, and was subsequently joined in the test programme by seven further prototypes, all of which were fitted with the landing skid type of undercarriage. Two of these aircraft were four-engined versions to test alternative engine layouts, one of which was later adopted for the Ar 234C. For many reasons the skid undercarriage proved to be impracticable, and it was decided to fit a normal retractable undercarriage. The first prototype so fitted was the V9, the installation requiring design changes to the fuselage cross-section, and the repositioning of the fuel tanks.

The first operational aircraft was delivered to KG 76 in August 1944, which in the event was the only bomber unit to use the Ar 234. Some reconnaissance versions were used by 1(F)/100 towards the end of the war. At the end of hostilities only some 210 examples had been completed and of these few reached operational status.

For the full story of the development and use of this remarkable aircraft one can but recommend the reading of Profile No. 215 which gives excellent coverage on the subject.

Heading picture shows an Arado at Farnborough in 1946 in company with an Me262. Below is the pilot's view of a prototype's control and instrument panel layout. Although large, the cockpit was cramped with equipment.

The Ar 234 was of completely conventional layout for its time except for the use of the jet engines. It was of all-metal construction, and despite its 'aerodynamic normality', the Ar 234 was probably the most efficient and sophisticated bomber in production anywhere, and in its class only to be surpassed by the Canberra which did not fly until 1949. The Ar 234C version was also the only four-jet bomber actually in production during the war.

In the bomber version the normal bomb-load was 1,000 kgs., either consisting of a single fuselage store, or two 500 kg. bombs one under each engine nacelle. (This was also the maximum load which could be carried under the engines.) Take-off weight in this configuration was 20,833 lbs. With Rocket Assisted Take-Off units fitted, the maximum bomb-load went up to 1,500 kgs., giving a take-off weight of 22,068 lbs. In this configuration one SD or PC 1,400 under the fuselage, or three 500 k.g. stores, or one SD/SC 1,000 bomb plus two partially filled drop tanks could be carried. (1 kg. = 2·205 lbs.)

The bombs were loaded on to the aircraft by means of a block and tackle arrangement which was attached to the nosewheel oleo. For loading the fuselage bomb a small bearing wheel was also fitted to the underside of the fuselage just forward of the recessed fairing. (See Figs. 1 and 2.)

In the reconnaissance role, two Rb 50/30 cameras were carried in the rear fuselage, but alternatively, combinations of the Rb 75/50, Rb 20/30 or Rb 75/30 cameras could be used. When thus fitted the Lotfe 7K bombsight (Fig. 5) was removed, and camera control boxes were fitted on the same mountings between the pilot's legs (Fig. 4).

With regards to flying characteristics the Ar 234 was reported to be a pleasant machine to fly, although it did suffer from low directional stability. This was for two main reasons, firstly because the centre of gravity was well aft, a feature which was common to most early jet designs. This condition was especially marked with the carriage of the cameras so far aft. Also during construction the finish of the fin/rudder combination was poor, the less efficient

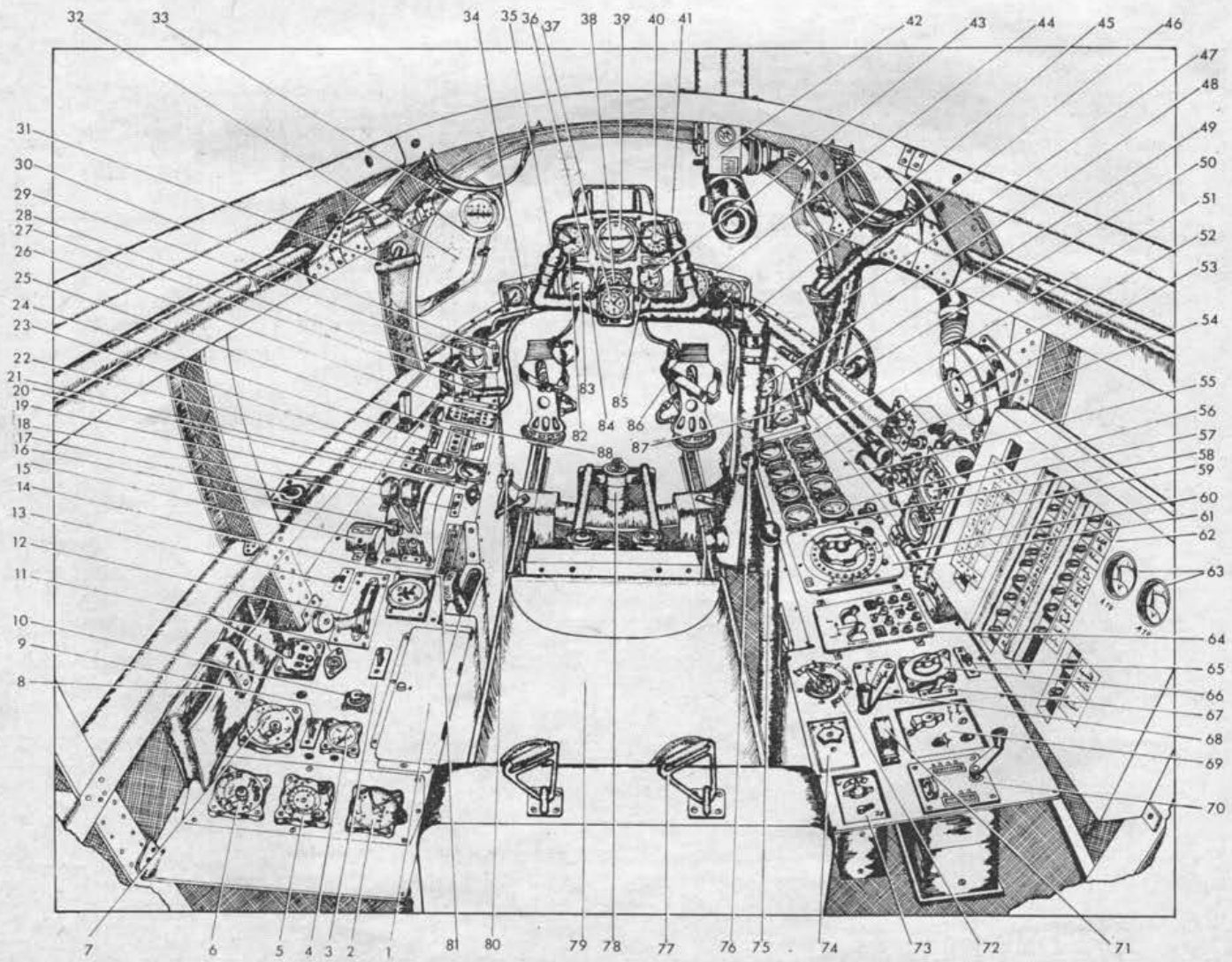
airflow from which also contributed to a lowering of the directional stability characteristics.

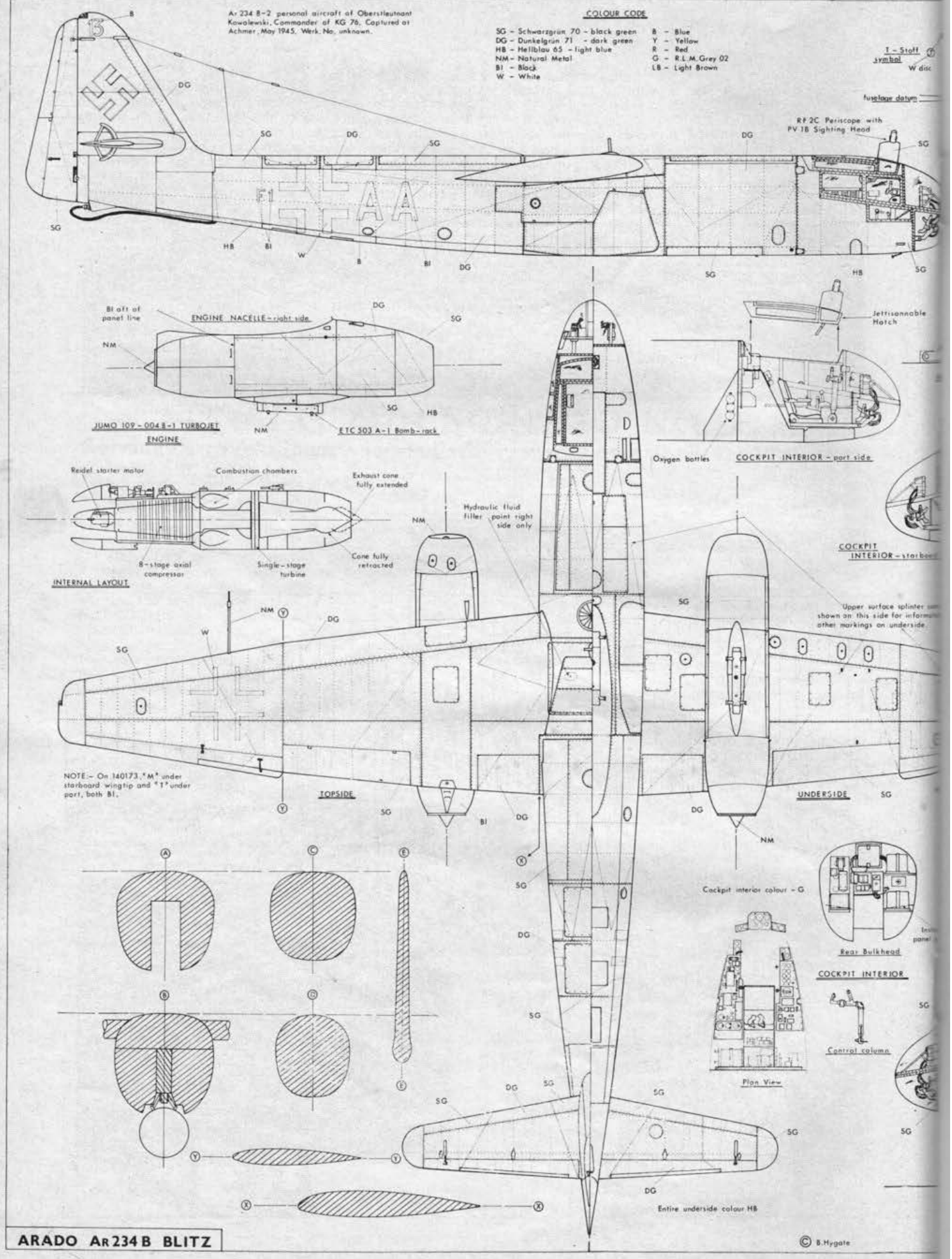
The biggest problem, however, was the temperamental nature of the Jumo 004 engines. These had to be handled very delicately at all times, especially during starting and stopping. But even with the most careful handling their life was only about 25 hours! The lack of immediate power response was one of the hardest things with which ex-piston engine experienced pilots had to contend, and combined with landing accidents due to the unfamiliar high landing speeds, was the cause of most training accidents.

The closely spaced mainwheels did not aid taxying, and cornering had to be done with care. Differential braking effect was also not very good due to the narrow track of the undercarriage, the brakes not being very efficient at the best of times!

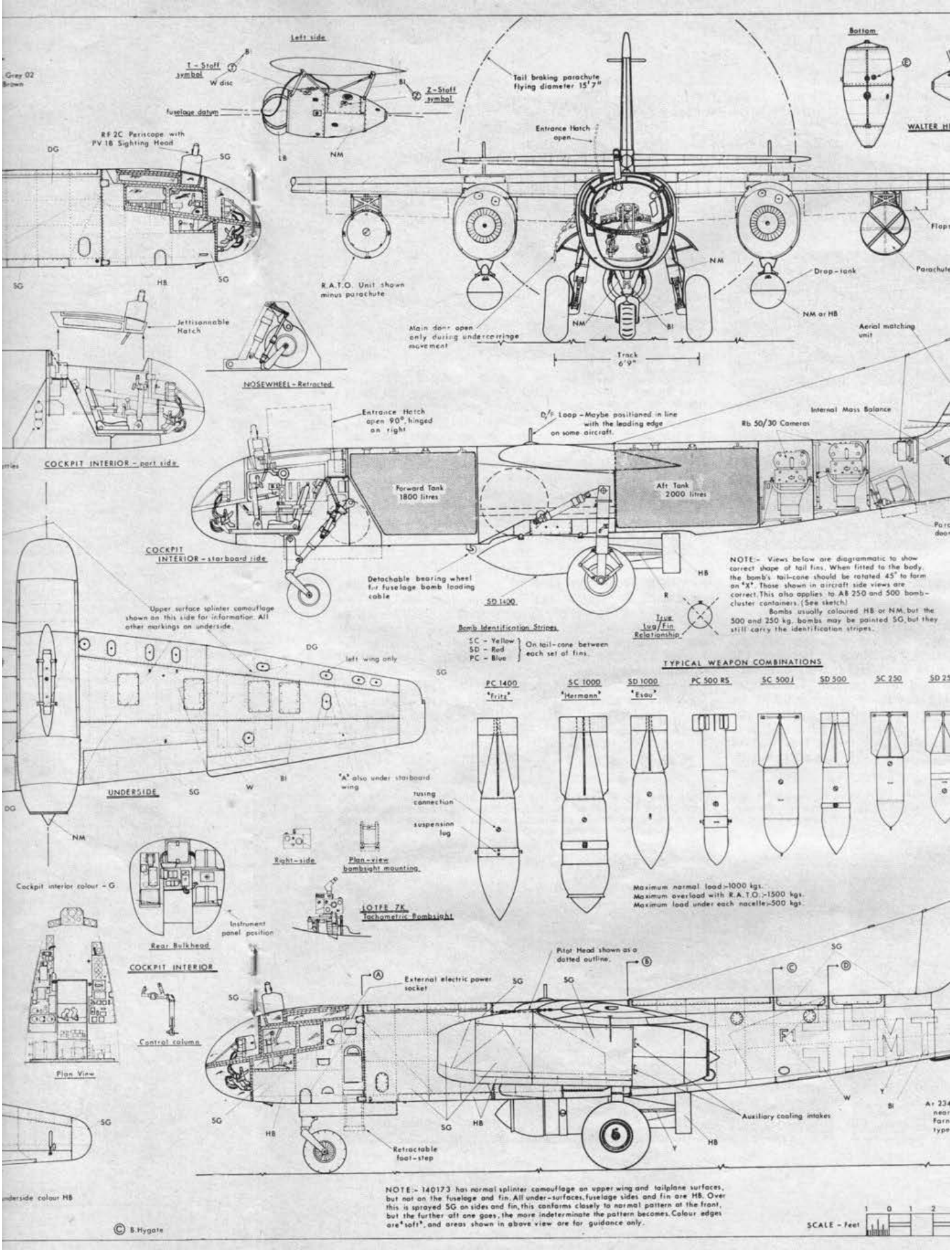
COCKPIT LAYOUT KEY:

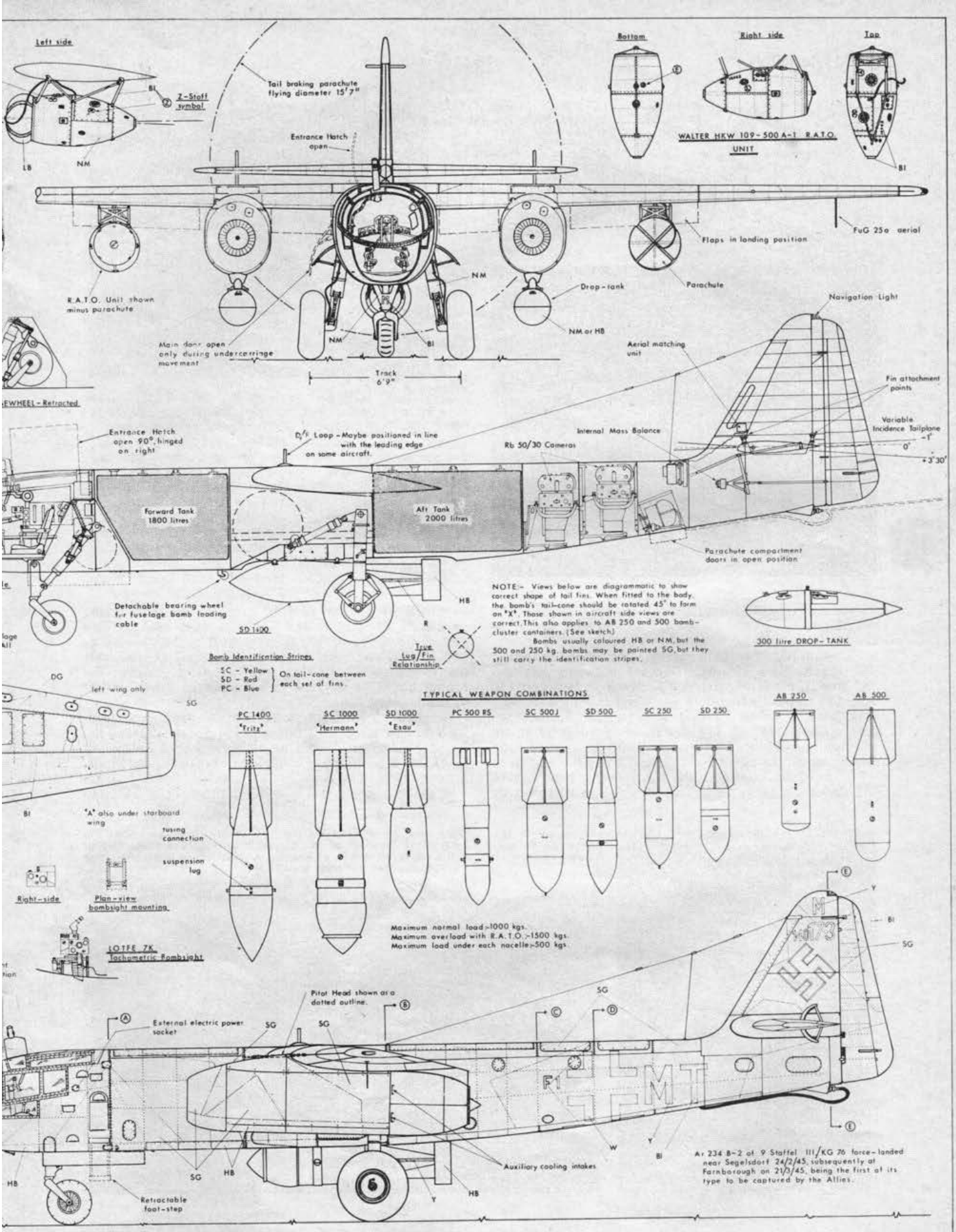
1 Navigation Equipment Stowage
2 Contact Altimeter
3 Nozzle Control Over-ride Switch
4 Outside Air Temperature Gauge
5 Height Corrector — BZA 1
6 Wind Corrector — Bombsight
7 Rectified Airspeed Corrector — Computer
8 Map Case
9 Exhaust Nozzle Control Switch
10 Cockpit Lights Rheostat
11 R.A.T.O. Jettison Button, and Selector Panel
12 Fuel Cocks
13 Auxiliary Fuel Tank Selector Switch
14 Rudder Trim Wheel and Indicator
15 Ignition Switch and Warning Indicator
16 Throttle Friction Damper
17 Spirit Level
18 Floodlight Switches
19 Throttle Quadrant
20 Emergency Master Electrics Circuit Breaker
21 Hydraulic Pressure Gauge
22 Gyro Monitor Switch
23 Autopilot Channel Selectors, Elevator/Aileron/Rudder
24 Target Approach Switch
25 Flap and Undercarriage Selector Panel
26 Flap and Undercarriage Position Lights
27 Braking Parachute Streaming Handle
28 Incidence Indicator
29 Repeater Gyro Horizon
30 Autopilot Master Switch
31 Braking Parachute Jettison Handle
32 Opening Direct Vision Panel
33 Standby Magnetic Compass
34 Port and Starboard E.P.R. Gauges
35 Bomb Release Button on Left Control Column 'Horn'
36 Pilot Heater Indicator
37 Clock
38 Master Compass Indicator
39 Gyro Horizon and Slip Indicator
40 Rate of Climb and Descent Indicator (R.C.D.I.)
41 Turn Control for Autopilot – Fast and Slow Rate
42 RF 2C Periscopic Bomb/Gunsight
43 AFN 2 Homing Indicator
44 Port and Starboard RPM Gauges,
45 Control Column – Releases Forward for use of Lotfe 7K Bombsight
46 Canopy Jettison Handle
47 Oxygen Hose
48 Port and Starboard Fuel Pressure Gauges
49 Bomb Jettison Handle
50 Flare Pistol Mounting
51 Oil Pressure Gauges
52 Fire Warning Temperature Gauges
53 Oxygen Regulator
54 Riedel Starter Motor Panel – together with RPM Gauge High/Low Range Selector Buttons
55 Exhaust Gas Temperature Gauges
56 Fuel Contents Gauges – Main Fuselage Tanks only – with Low Fuel Contents Lights mounted behind them
57 Oxygen System Pressure Gauge
58 Low Fuel Contents Indicators
59 Oxygen Flow Indicator
60 Oxygen System ON/OFF Cock
61 Bomb Fusing Selector Panel
62 Main Electrical Switch Panel
63 Voltmeters
64 Bomb Sequence Selector Panel
65 Navigation Lights Switch
66 Frequency Selector
67 FuG 125 – Hermine (bearings from ground rotating beacon)
68 Camera Doors Operating Handle
69 FuG 25A I.F.F.
70 Camera Operating Panel
71 FuG 25A Demolition Switch
72 Flap and Undercarriage Emergency Selector
73 FuG 16 ZY Junction Box
74 Remote Control Panel for FuG 16ZY Homing Aerial
75 Hydraulic Hand Pump – Operates Service which has been selected on 72
76 Control Column Release Knob
77 Shoulder Strap Attachment
78 Mounting for Lotfe 7K Tachometric Bombsight
79 Pilot's Seat
80 Cabin Conditioning Selector
81 Tailplane Trim Actuator Handle and Position Indicator
82 Altitude Compensated Airspeed Indicator
83 Fine/Course Altimeter
84 Clock Illumination Button
85 R/T Transmitter Button
86 Footbrake Motors
87 Ultra Violet Cockpit Light
88 Gyro Horizon Erection Switch





ARADO AR 234 B BLITZ


Left side
Grey 02
Brown
T - Staff symbol
W disc
Z - Staff symbol
fuselage datum
RF 2C Periscope with PV 18 Sighting Head
DG
SG
LB
NM
HB
Tail braking parachute flying diameter 15'7"
Entrance Hatch open
R.A.T.O. Unit shown minus parachute
Main door open only during undercarriage movement
Track 6'9"
Drop - tank
NM or HB
Bottom
WALTER H
Flaps
Parachute
Jettisonnable Hatch
NOSEWHEEL - Retracted
COCKPIT INTERIOR - port side
Entrance Hatch open 90°, hinged on right
D/F Loop - Maybe positioned in line with the leading edge on some aircraft.
Rb 50/30 Cameras
Internal Mass Balance
Aerial matching unit
Forward Tank 1800 litres
Aft Tank 2000 litres
COCKPIT INTERIOR - starboard side
Detachable bearing wheel for fuselage bomb loading cable
SD 1400
Upper surface splinter camouflage shown on this side for information. All other markings on underside.
left wing only
UNDERSIDE
W
Bl
'A' also under starboard wing
Bomb Identification Stripes
SC - Yellow
SD - Red
PC - Blue
On tail-cone between each set of fins.
True Lug/Fin Relationship
NOTE:- Views below are diagrammatic to show correct shape of tail fins. When fitted to the body, the bomb's tail-cone should be rotated 45° to form an 'X'. Those shown in aircraft side views are correct. This also applies to AB 250 and 500 bomb-cluster containers. (See sketch)
Bombs usually coloured HB or NM, but the 500 and 250 kg. bombs may be painted SG, but they still carry the identification stripes.
TYPICAL WEAPON COMBINATIONS
PC 1400 'Fritz'
SC 1000 'Hermann'
SD 1000 'Esau'
PC 500 RS
SC 500 J
SD 500
SC 250
Maximum normal load - 1000 kgs.
Maximum overload with R.A.T.O. - 1500 kgs.
Maximum load under each nacelle - 500 kgs.
tussing connection
suspension lug
Right-side
Plan-view bombsight mounting
Cockpit interior colour - G
Instrument panel position
Rear Bulkhead
COCKPIT INTERIOR
Control column
Plan View
JOTFE 7K Tachometric Bombsight
Pitot Head shown as a dotted outline.
External electric power socket
Auxiliary cooling intakes
Retractable foot-step
Underside colour HB
NOTE:- 140173 has normal splinter camouflage on upper wing and tailplane surfaces, but not on the fuselage and fin. All under-surfaces, fuselage sides and fin are HB. Over this is sprayed SG on sides and fin, this conforms closely to normal pattern at the front, but the further aft one goes, the more indeterminate the pattern becomes. Colour edges are 'soft', and areas shown in above view are for guidance only.
SCALE - Feet
1 0 1 2
© B. Hygate


Left side
Bottom
Right side
Top
Z-Staff symbol
Tail braking parachute flying diameter 15'7"
Entrance Hatch open
WALTER HKW 109-500 A-1 R.A.T.O. UNIT
FuG 25a aerial
Flaps in landing position
Parachute
Drop-tank
NM or HB
R.A.T.O. Unit shown minus parachute
Main doors open only during undercarriage movement
Track 6'9"
Navigation Light
Aerial matching unit
Fin attachment points
Variable Incidence Tailplane
Internal Mass Balance
Rb 50/30 Cameras
Entrance Hatch open 90°, hinged on right
D/F Loop - Maybe positioned in line with the leading edge on some aircraft.
Forward Tank 1800 litres
Aft Tank 2000 litres
Parachute compartment doors in open position
Detachable bearing wheel for fuselage bomb loading cable
SD 1400
Bomb Identification Stripes
SC - Yellow
SD - Red
PC - Blue
On tail-cone between each set of fins.
True Lug/Fin Relationship
NOTE:- Views below are diagrammatic to show correct shape of tail fins. When fitted to the body, the bomb's tail-cone should be rotated 45° to form an "X". Those shown in aircraft side views are correct. This also applies to AB 250 and 500 bomb-cluster containers. (See sketch)
Bombs usually coloured HB or NM, but the 500 and 250 kg. bombs may be painted SG, but they still carry the identification stripes.
300 litre DROP-TANK
TYPICAL WEAPON COMBINATIONS
PC 1400 "Fritz"
SC 1000 "Hermann"
SD 1000 "Esau"
PC 500 RS
SC 500 J
SD 500
SC 250
SD 250
AB 250
AB 500
left wing only
"A" also under starboard wing
fusing connection
suspension lug
Right-side
Plan-view bombsight mounting
LOTFE 7K Tachometric Bombsight
Maximum normal load :-1000 kgs.
Maximum overload with R.A.T.O. :-1500 kgs.
Maximum load under each nacelle :-500 kgs.
Pitot Head shown as a dotted outline.
External electric power socket
Auxiliary cooling intakes
Retractable foot-step
Ar 234 B-2 of 9 Staffel III/KG 76 force-landed near Segelsdorf 24/2/45, subsequently at Farnborough on 21/3/45, being the first of its type to be captured by the Allies.
NOTE:- 140173 has normal splinter camouflage on upper wing and tailplane surfaces, but not on the fuselage and fin. All under-surfaces, fuselage sides and fin are HB. Over this is sprayed SG on sides and fin, this conforms closely to normal pattern at the front, but the further aft one goes, the more indeterminate the pattern becomes. Colour edges are "soft", and areas shown in above view are for guidance only.
SCALE - Feet
1 0 1 2 3 4 5 6 7 8 9 10 11 12

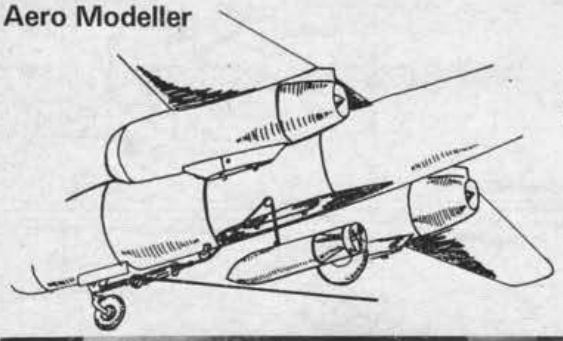


Fig. 1. Fuselage bomber loading

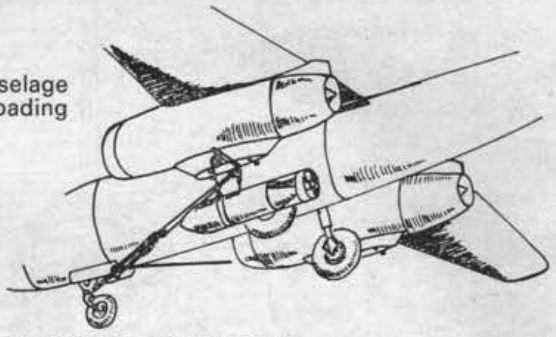
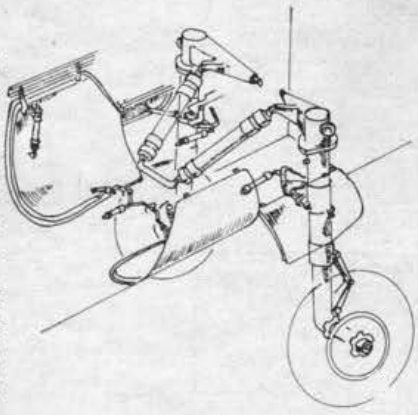


Fig. 2. Engine-mounted bomb loading



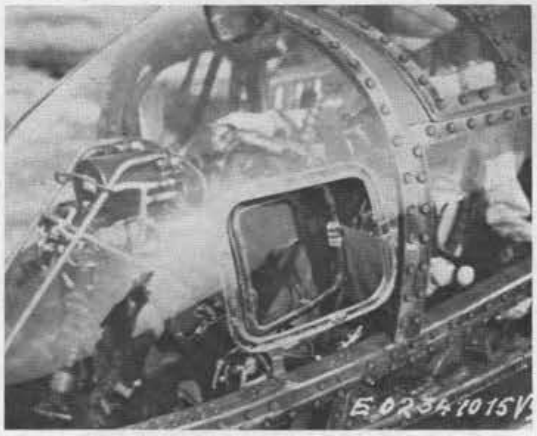
Close up of AR 234 V 9 (PH-SQ) – the prototype of the 'B' series, distinguished by its conventional retract-tricycle undercarriage in lieu of the clumsy trolley/skid combination of the 'A' series. As shown in Fig. 3 at right, the mainwheels pivotted inwards as the undercarriage members retracted forward to enable them to fit within the narrow fuselage.

Normal climbing speed was 250 m.p.h., and the maximum allowable speed was 453 m.p.h., at 19,750 feet. (Clean, with no bombs.)

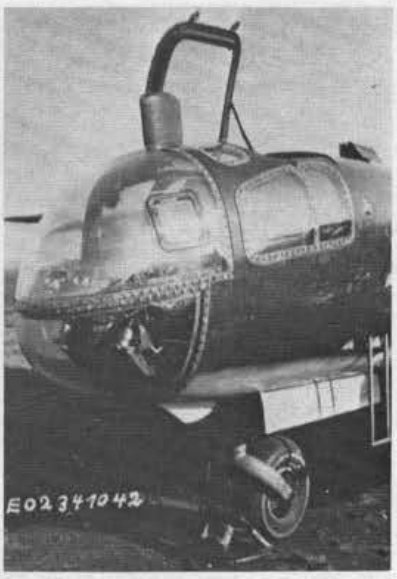
For landing, the undercarriage was lowered below 217 m.p.h., and 25° flap selected between 200 and 155 m.p.h. Final approach was flown at between 150 and 175 m.p.h., dependent on weight. Full flap, 45°, was lowered when landing was certain. Touchdown was made at 110 to 115 m.p.h., again depending on the landing weight. Full brakes could be applied only when the aircraft had slowed to 75 m.p.h., and even when held on continuously the landing run was of the order of 3,000 feet. This could be shortened by as much as 50 per cent by use of the tail-braking parachute as well as the foot operated brakes. This parachute could be streamed with a speed as high as 135 m.p.h., and thus could be deployed immediately on touchdown, allowing the speed at which the brakes could be applied to be achieved much earlier in the landing run.

Single-engined flight posed no real problems, stabilised height after drift-down being about 17,000 feet. An engine relight could be attempted to a maximum of 13,000 feet. If a single-engined approach was made, an overshoot was possible provided that the decision was made early enough and no more than 25° flap

Left, entry to the cockpit was via a hatch in the top of the fuselage – note the periscope mounted immediately forward of the hatch to provide rearward vision. Below, another view of the captured Arado at Farnborough where it provided much interest for our own scientists.



REPRINTS OF THIS FEATURE, PLUS DRAWINGS TO 1/24TH AND 1/48TH SCALE, ARE AVAILABLE AS PLAN PACK AJH2933, PRICE 50p, PLUS 5p POSTAGE FROM AEROMODELLER PLANS SERVICE.



Views of the nose section at left and right reveal the unparalleled forward vision given to the sole crew member via the .218 in. thick plexiglass glazing.

had been lowered. Therefore, full flap was lowered at all times only when committed to land.

The phantom side-view in the accompanying drawing is a composite diagram showing both the bomber and reconnaissance versions. The reconnaissance version would not normally carry any bombs, and the bomber version not the cameras. Otherwise the equipment shown is common to both.

The bomber version was not usually fitted with a Peil 6B D/F antenna (the 'cartwheel' level with the wing leading edge in the plan-view). In this case the normal D/F loop was moved forward on some aircraft in line with the wing leading edge at the root.

A point when finishing a model of the aircraft, on the full-size one, the skin was flush-rivetted and all joints, etc., were filled and rubbed down before the final paint scheme was applied. New aircraft were polished, but this gradually wore off in service. Paint jobs in the field were of necessity more hurried and were usually of matt finish.

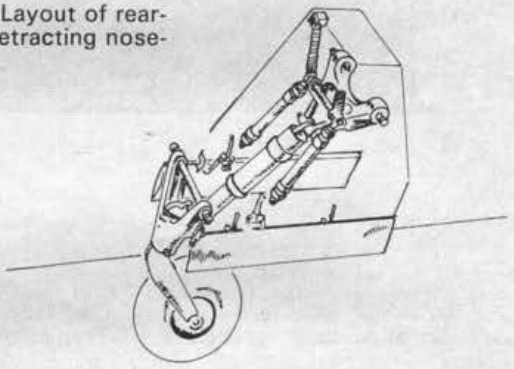


Fig. 7. Layout of rearward retracting nosegear.

Captured Aircraft

At least 13 Ar 234B's were captured and brought to the West for evaluation, nine coming to England and four to America. These included:

England

Ar 234	B-2	140466	AM.24	Crashed at Farnborough
	B-1	140008	AM.25	VK 880
	B-2	140476	AM.26	VK 877 'D'
	B-1	140113	AM.54	VH 530
	B-	140141		
	B-	140356	AM.266, 227, 228 and 229	
	B-	140493	were allocated to four out	
	B-	140581	of these	
	B-	140596		
	B-2	140173	Dissected for examination	

U.S.A.

Ar 234	B-2	140312	FE-1010
	B-2		FE-1011
	B-		FE-1948
	B-2		"Navy 121445"-'202'

Of all the above aircraft, only one now exists, FE-1010, which is at present in storage for the Smithsonian Institute, at Silver Hills.

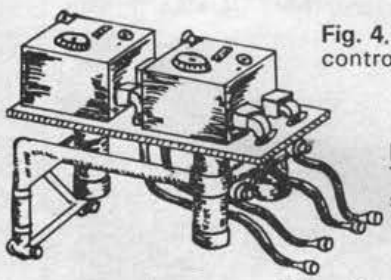


Fig. 4. Reconnaissance camera controls.

Fig. 5. (Below) Lofte 7K Tachometric bombsight.

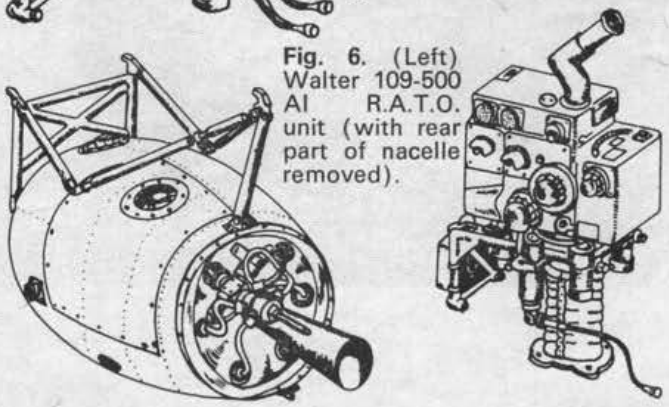


Fig. 6. (Left) Walter 109-500 AI R.A.T.O. unit (with rear part of nacelle removed).

Arado Ar 234B

Span: 47 ft. 3¼ in.
Length: 41 ft. 5½ in.
Height: 14 ft. 1¼ in.
Power Plants: Two Junkers Jumo 109-004 B-1 turbojets producing 1,984 lbs., static thrust at Sea Level.
Max. Take-Off Weight: 22,068 lbs.
Max. Landing Weight: 15,432 lbs.

The author wishes to acknowledge the great help given to him by the following organisations and their staff whilst preparing the accompanying drawings: The Documents Section of the Imperial War Museum (with whose permission Figs. 1, 2, 3 and 4 are reproduced), the R.P.E., Westcott, and the Defence Explosives Ordnance Disposal School, Rochester.

FLYING SCALE MODELS

by Eric Coates

Part XIII
Conclusion

Left: A flashback to the 1960 British Nationals shows R. Hackett, of Chichester, kneeling with his ¼th scale Bucker Jungmeister finished in Swiss markings, and John Simmance with a ¼th scale Sopwith Snipe in the R.A.A.F. colour scheme. The Jungmeister has Frog 80 power, the Snipe a Frog 150R.

I HAD INTENDED that Part 13 would be the end of this series. I proposed to clarify one or two points made earlier and correct some of the errors which inevitably creep into the printing of such a series, thank all my readers for their indulgence, and say goodbye.

However, to judge from the many letters both I and the Editor have received concerning these articles and the undoubted resurgence in Free-Flight Scale Flying in the past year, for which I hope I may have played a small part, I have been prevailed upon to continue these columns. One unfortunate facet of part-time journalism is the large amount of time it consumes. When one's spare time is strictly limited (if only one didn't have to pursue one's bread-winning profession for so many hours a week), such writing makes big inroads into one's building time. Therefore, *Flying Scale Column*, as the continuance series will be known, will be somewhat shorter and may not appear every month. What I intend to do is introduce more 'newsy' items, report on scale meetings, etc., as well as continuing to give constructional hints and tips. The emphasis will still be on Free-Flight but I will not be adverse to occasional variations on the Radio and Control Line theme. In order that such a column can be a true reflection on the scale movement at large I must rely, to a certain extent, on correspondence. If anyone has any scale news, or tips which they think may be of general interest, please let me know either via the Editor or directly to my home address ('Arosa', Liberty Road, Newtown, Nr. Fareham, Hants).

This is my opportunity now to thank all those people who have written me such kind letters; particularly the many from Australia and the U.S.A. I am sorry that I have been unable to reply to them all – if I had, I wouldn't have built anything at all this past year!

Now down to the business of rounding off the current series. It is not essential that I clarify *all* the outstanding points this month, as I can refer back to various aspects in detail as the opportunity arises in succeeding issues. I will, therefore, only deal this month with what I consider the more general points.

Choice of Prototype

Many people approach me and ask what is a suitable choice for a beginner to scale modelling, or do I think such-and-such will make a good model. I dealt in some detail with the desirable attributes to look for in a prototype in Parts 2 and 3 (*April, May* 1971 *Aeromodeller*) but did not make many out-and-out specific recommendations. However, the following is a 'recommended' listing, roughly categorised to assist you in your choice:

(1) Very stable, sturdy and not overblessed with

The Fairchild P2 makes an excellent introduction to scale modelling as it has simple lines, an easily reproduced engine and high wing layout for good stability. This example is Enya 15D powered, and was made by J. Archbold of Leicester.

detail, making them ideal beginners' subjects.

(a) *W.W.1 Subjects*
Bristol Scout D, S2A, M1 Monoplane.
Martinside S2, Elephant.
Sopwith Tabloid, Baby, 1½ Strutter.

(b) *Between Wars*
Avro Baby, Avian.
De Havilland 60 Moths, 82a Tiger Moth, 87b Hornet Moth.
Mitsubishi I.M.F.I.
BU 133b Jungmann, Stampe SV4B.
Blackburn Bluebird.

(2) Fairly stable subjects but offering greater structural difficulties and/or much greater detail, such as exposed engines.

(a) *W.W.1 Subjects*
Armstrong Whitworth FK3, FK8.
Avro 504 series.
BE2C, D & E, BE12A & B.
Blackburn 1912 Monoplane, White Falcon.
De Havilland 4, 6, 9 & 9a.
Martinside Buzzard.
RE8.
SE5.
Sopwith Pup and Triplane.
Hannover CL 111a.
Rumpler C series.
Albatross C111.
Breguet 14.
Nieuport 28.

(b) *Between Wars*
Armstrong Whitworth Siskin 111a.
Avro Tutor.
Blackburn B2, Dart, Ripon.
Gloster Gauntlet, Gladiator.
Fairey Gordon, IIIF, Flycatcher.
Hawker Hart Series, Nimrod, Woodcock, Tomtit.
Vickers Vildebeest.
Westland Wapite, Lysander.
Heinkel 51.
Focke Wulf 44 Stieglitz.

The foregoing are just a selection and are not intended to be a complete listing in any way – they are predominantly British, and have a touch of personal preference amongst them! Certainly, if built carefully, none should prove difficult to trim. You will note that the most glamorous fighters of the First War are omitted, i.e. the Camel, Fokker D7, Albatros DV and Spad S7. I am not saying that a skilled man

Eric's Rumpler CIV is an extremely attractive ship, but one which he places in his 'No. 2' category – better suited to those with prior, scale modelling experience, but it is still quite a stable flier.

cannot make them fly, but they are certainly tricky, all lacking natural stability – which, of course, is why they were such good mounts. No account has been taken as to the ease in which constructional details can be obtained – some are very well documented, whereas others offer a much greater challenge. Please, however, do not write to me personally for such details, as I gave details of likely sources in *Part 2!*

Fuel

There have been many queries as to the exact ingredients used in the fuel. In *Part 3* I mentioned that I do not include castor oil in my fuel, unlike most commercial brews, as, in time, this will attack cellulose finishes. I never use fuel proofer – I hate the stuff! The following formula is good for all longish-stroke sport diesels but is not recommended for high-revving racing motors!

Paraffin	36%
Ether	36%
Castrol GTX	25%
Amyl Nitrite	3%

The ratio of the main components is not critical, but the Amyl Nitrite content is though. Mills engines, surprisingly, do like a fairly high dope content to keep them running smoothly.

Wing Structure

In Part 6 (*August*, 1971) it was stated that ribs should be cut from either 1/16 in. or 3/32 in. balsa, but this should have read 1/16 in. or 1/32 in. balsa. With average spacing I usually use 1/16 in. ribs but for closer spaced jobs there are advantages in using 1/32 in. First, the weight saving. This is not as great as might be at first thought, as a harder grade of balsa must be used for the thinner ribs if they are to resist buckling. The greatest advantage is that more can be sandwiched together between templates at one go, so reducing the rib making chore!

The other point I wish to elaborate on in the wing structure is the ⅛ x 1/16 in. spruce anti-warp spar. This should be let in to the upper surface of the ribs at the point of maximum camber. At this point the ribs should be slotted 1/16 in. x 3/16 in. deep. (This is slotted in the template and cut out of the ribs when they are all blocked together). The ⅛ x 1/16 in.

Floatplanes are an unusual choice, but do make attractive subjects – at least they won't nose-over when landing on short grass! Note the alternative undercarriage in the foreground. This example of a Piper Cub was built by E. Wisbey and uses a Frog 3.49D to carry its 4½ lb. aloft.

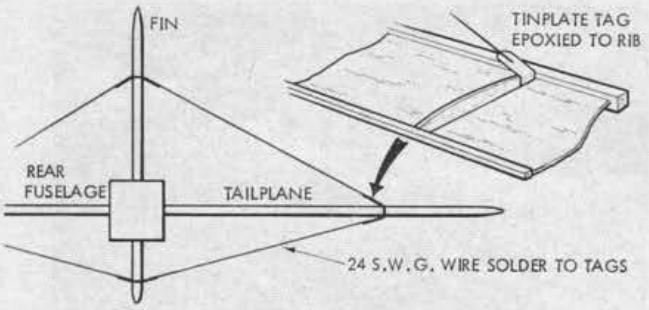


Fig. 1 Tailplane Bracing

spar is the last to be fitted and is dropped down to the bottom of the slot, leaving a 1/16 in. gap on top. This gap is filled by bits of 1/16 in. square to give a smooth top rib contour.

Tail Bracing

In Part V (*July* 1971) I devoted the whole article to bracing and wing attachment. Pressure of space meant that tail rigging had to be somewhat glossed over. Without working steel bracing wires many of the large area tail surfaces of W.W.1 types are very weak indeed; most tailplanes have a scale thickness of about $\frac{1}{8}$ or 3/16 in., making them very whippy indeed. Of course, you *can* cheat and thicken the tailplane up, but this looks awful, so I therefore advocate the following method, as illustrated in fig. 1.

Whilst on the subject of tailplanes, let me emphasise once again the necessity to keep the whole tail end as light as possible. Remember, $\frac{1}{4}$ oz. saved on the tail can save up to 2 oz. of ballast in the nose – well worth bearing in mind.

Guns

Now for one glaring clanger (Brickbats to the Editor). In Part X (*December* 1971) I stated that the Vickers, Lewis and Spandau were drawn to $\frac{1}{8}$ scale. So they were on my original drawing. Unfortunately, they were reproduced to something approximating to 1/12 scale. I hope there are not too many models flying with undersized armament!

Now to my news items for the month. These concern the **Scale Contest Calendar.** First the *Super Scale Event.* This will take place at the Hullavington Nationals at the Spring Bank Holiday (it will be the only Free Flight S.M.A.E. Contest at this half of the split Nationals) and not at the all-Scale Meeting in September as announced in the Provisional Calendar.

That fellow Manley again – this time giving a decisive launch to his R.E.8 – not the sort of aircraft to gently float from your hands!

There still will be a F/F scale event at the *All Scale Meeting* but not for the 'Super'.

Events where Free Flight Scale Competitions will take place in 1972 are as follows:–

May 28/29th *Super Scale Trophy* at the R/C, C/L and Scale Nationals, Hullavington.

June 18th *Aeromodeller Scale Meeting,* Old Warden. Not strictly a contest but a friendly get-together with the emphasis on flying.

September 3rd *Selby Trophy* at the Northern Area Rally, R.A.F. Lindholme, near Doncaster.

September 24th *S.M.A.E. All Scale Meeting,* Little Rissington, Gloucestershire.

At the time of writing I do not know on which date the *Eddie Riding Memorial* event will be flown. Last year, due to the ban on power models at Woodford, the N.W. Area kindly presented it to the winner of the S.M.A.E. *All Scale Meeting.* I hope it will be held as a separate competition again at Woodford.

At all these meetings, with the exception of the Northern Area Rally, events will also be held for R/C & C/L scale models.

Next year will see the **2nd Scale World Championships**, for R/C and C/L models only, I am afraid. Unfortunately, although F.A.I. rules are drawn up (the S.M.A.E. F/F Scale Rules are identical) free flight is only a provisional class, it being generally thought that there would be insufficient world support for such an event. I do not know that I altogether agree with this, because entries to F/F Scale events in this country are usually higher than in Control Line. Generally the standard of entry is higher, too. I would be very pleased to hear world-opinion on this matter. The World Championships this year will be hosted to our nearest neighbour: France, the event taking place over the period 2nd-6th August at the Air France training airfield at Toulouse. Not the airfield, I am assured, used for Concorde test flying!

The Scale Trials to select the British teams are scheduled for the 25th June.

The S.M.A.E. Scale Committee elected for 1972, by the way, is as follows:–

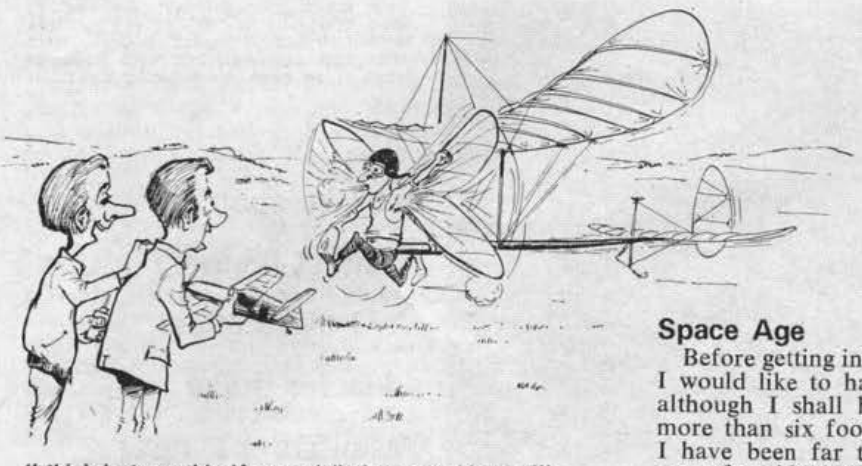
Dennis Thumpston, Cesare Milani, Denis Bryant, Mick Charles, Roy Yates, Eric Coates.

TAILPIECE A most unsuitable landing place for Terry Manley's Blackburn 1912 monoplane. Even the best laid plans . . .

topical twists

by 'Pylonius'

Illustrated by 'Sherry'



'I think last month's 'Aeromodeller' went to his head!'

Airing Off

The latest craze is a sort of boneless aeromodelling Hard luck though it may be on the balsa trade you ignore the innards and just paste up the tissue paper into a balloon-like shape and propel it into the ether with a charge of hot air, *à la* Montgolfier.

The beauty of this form of flying is that you cause no noise or nuisance and you can forget all about insurance. The only equipment you need is a long ladder to undrape the fabric from pylons and chimney pots.

One note of protest, though, from the *Society for the Preservation of Model Flying Machines:* why is not the paper bag filled with rubber like any self respecting model aircraft should be?

Sharp Words

An odd thing is that the faster the model prop goes round the sharper do the blades become. When props revolved at a speed where, to count the revs, you needed not so much a tachometer as a quick eye, they were made of nice soft wood, humanely blunted on all edges, but as the number of noughts on the r.p.m. index have become extended so have the blade edges become as keen as a razor commercial. And in order to facilitate a better cutting angle the jet needle has got closer and closer to the prop. To assist the general mayhem even more the people who operate the de-digitizers seem to be just that little bit more nervous than other people, although they probably didn't start out that way.

For my own part I gave up model engines when I could no longer see the prop go round; a state attributable to the higher revs rather than to senility of vision.

Dead End

We are told that the S.M.A.E., is now fifty years old. To think that way back in the roaring twenties there were people turning out model flying contraptions with all the enthusiasm we see around us in the even more roaring seventies. But what if we were to bring back some of those doughty pioneers of flight who battled so bravely for the odd few seconds to the electronic, fly-as-long-as-you-like, modern scene?

I can only presume that they would watch goggle-eyed as a multi-scale model goes through a complicated stunt schedule, and then one would say to the other, 'Well, there couldn't be anything to see after that. Close the hatch, Charlie'.

Space Age

Before getting into my six foot of eternal flying space I would like to have a stab at a flying scale model, although I shall have to hurry up if I am to find more than six foot of space to fly it on. Up to now I have been far too lazy to even attempt anything more formidable than the simple basic flying machine, or, often, non-flying machine, but at times I yearn for a concoction of silver and gloss which will bring forth something other than a gasp of horror from the habitues of the local flying field. Unfortunately, or perhaps fortunately, I just have nowhere to keep the less collapsible form of model craft, although I have threatened on many an occasion to convert the loft space to model use, but as this has proved as unrealisable as building that scale model, it looks as if I will be sticking to my basic model way of life.

Current Affairs

This may be an affluent society, but it will have to be a bit more affluent yet if we are to afford the latest luxury, the electric powered model, at about £50 per flight. This cost per second of performance time is roughly what Raquel Welch earns on the film set. This makes your only hope of going electric an extremely faint one; getting matey with Raquel Welch – and keeping her working.

But why all the fuss over electric power? The fastest milk float in the west may be electric powered, but its not likely to win the Monaco Grand Prix. Likewise the electric powered model is somewhat tame compared to a high revving glow engine, and far more troublesome to feed. But, perhaps its the pollution people are worried about. Lots of people now are prepared to jog along the road at milk float speed in order to cut down on the sulphuric effluent, although no-one seems to have told them that what doesn't come out of the car exhausts will belch forth from the new giant power station chimneys, and the whole country will be so festooned with overhead power lines you will be able to use your electric car like a dodgem.

No, I can't say I find the prospect of electric engine power all that exciting. Old-fashioned rubber was good enough for our S.M.A.E. antecedents – and its cheap. Only problem is: how can I adapt it to run the car?

Riding High

All things seem to be possible with radio these days, even to dropping your Action Man by parachute.

'What would you like for your birthday, son?'
'Just something for my Action Man, Dad.'
'That ain't much, son. Such as what?'
'A radio model aircraft from which to drop him by parachute, Dad.'
'You'll get a chopper bike and like it, son.'

Two junior retrievers in the making here! Well, if you can't train your wife to fetch your wayward gliders, then your son and daughter will have to learn at an even more tender age . . .

a 51 in. span, contest-winning A/1 class glider, ideal for those 'Mini-comps' now so popular

'Little Hinney'

by TONY CORDES

DURING THE WINTER of 1969/70 I decided to build an A/1, mainly to compete in the several attractive competitions known as 'Mini-comps' run by the Northern Area of the S.M.A.E. My experience of glider flying at that time was entirely restricted to A/2's and several people told me that having flown these gliders, A/1's would be an anticlimax, since they generally towed badly, and had a comparatively poor glide. In an attempt to overcome these 'inborn characteristics' of A/1's, I decided simply to proportion-down my then-current A/2 design *Loner* (featured in the *AeroModeller Annual* 1969/70) incorporating the following design features which I thought would be beneficial.

Experience had shown that the wing section I was using on the A/2's resulted in a good glide, provided that a large tailplane/moment arm combination was used. I thus used this wing section, slightly thickened to account for the lower Reynolds number situation of the A/1 wing, and used a long moment arm (for A/1's) and a high lifting tailplane. In addition I used a sparless top surface on the wing to avoid any 'tripping' of the airflow over it, resulting in separated flow with the consequential disastrous drop in the lift coefficient. I further used a turbulator near the leading edge of the wing to produce the more stable turbulent boundary layer over the top surface thus giving additional safeguard against flow separation.

In my experience of modelling, spread over more years than I care to remember, all good models fly virtually 'off the board' and fortunately *Little Hinney* did just that. It lived up to all my design hopes in that it towed and glided extremely well. Its glide is good enough in fact that, provided there is no sink, it will easily top the two minute maximum required in most A/1 competitions without the aid of lift. Many a Northern timekeeper can vouch for that!

Little Hinney has a good contest record stretching back to May 1970 when it won its first contest entered, namely the *Tony Pannett* meeting in Yorkshire. Since then it has never failed to place in a contest and out of sixteen entered it has won eleven, been second three times and third twice, including first in the S.M.A.E. national competition and third in the Nationals in 1971. Apart from competition it has given my family and myself many hours of fun and provides an excellent relaxation from the serious business of flying A/2's!

The name was chosen simply because the model was completed more or less at the same time as my daughter was born. The expression 'hinney' is Geordie (that language of the far North) probably derived from 'honey' and is used as a term of endearment, mainly to females!

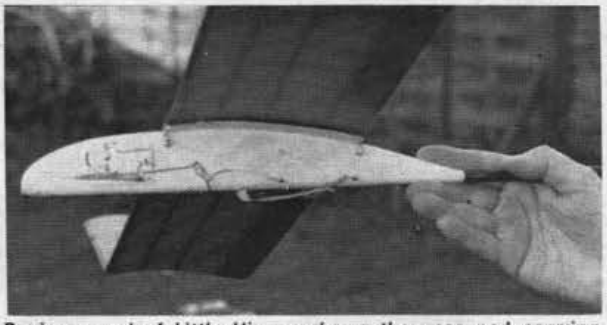
Construction should present no difficulty to those who have built some models previously but it is not recommended as a beginner's project. The only *real* advice is to build slowly and accurately, and in particular, get the wing incidence, dihedral angles and warps correct. Remember that the more care taken throughout construction, the better the resulting glide.

Begin by building the wing so that it may 'settle' while the rest of the model is built. A PVA adhesive is used throughout the construction of the model, except where specified as this gives the minimum of distortion on drying. Care should be taken with the wood selection – that used on the tips should be as light as possible whereas the remainder should be of medium weight except for the centre panel spars which should be strong and stringy. Remember that the completed wing should weigh no more that 3 ozs. and should ideally be about 2¼-2½ ozs.

Cut the trailing edges from 3/16 in. sheet and notch to take the ribs. Roughly shape the leading and trailing edges and pin them to the building board adding packing to both to give the required undercamber. No warps need be built in at this stage. Glue in all the ribs and ensure that the ribs at the dihedral joints are carefully angled. Add the ⅛ in. sheet gussets.

When all is dry remove the panels from the board and glue in the spars and add the centre 1/16 in. sheeting. Trim the ends of each panel and file or sandpaper them flush. Glue the ¼ in. sheet tips in place and shape. Finish the shaping of the leading and trailing edges. Using epoxy, firstly glue the tips to the centre panels and secondly join the wing halves; the four dihedral braces A, B, C & D may now be added. To complete the construction, gently sand all over with 600 grade wet and dry and then cover. The original used double covered Jap tissue on the centre panels and single layer on the tips. Alternatively, use heavyweight Modelspan on the centres and lightweight on the tips. Care should be taken when doping – do *one* panel at a time, packing to give the required warps, and *always* pinning down. Use two coats of 50/50 dope followed by two coats of 33⅓/33⅓/33⅓ dope/thinners/banana oil mixture, lightly sanding with worn 600 grade wet and dry between each coat. This results in a subtle waterproof finish. Complete the wing by adding the turbulator.

Make the tailplane from the *very* lightest 1/32 in. sheet and cut the bottom surface to size. Add the ⅛ in. x 3/32 in. leading edge. Using balsa cement pre-cement the bottom edge of the ribs and their respective positions on the bottom sheet. Add the



Business end of Little Hinney shows the nose pod carrying the timer and towhook assembly. Timer is operated on release of the tow line as per 'full-size' A/2 class gliders.

centre rib and hold until the joint is strong enough to support itself. In the same way add the tip ribs, then glue in the remainder of the ribs. Chamfer the leading edge to follow the curvature of the ribs, then balsa cement the top sheet to the leading edge and allow to dry. Using PVA stick down the top sheet by bending backwards over the ribs and use a weight and a length of scrap steel to hold it down at the trailing edge. When all is dry remove from the board and trim and sand to the final shape. Add the ply

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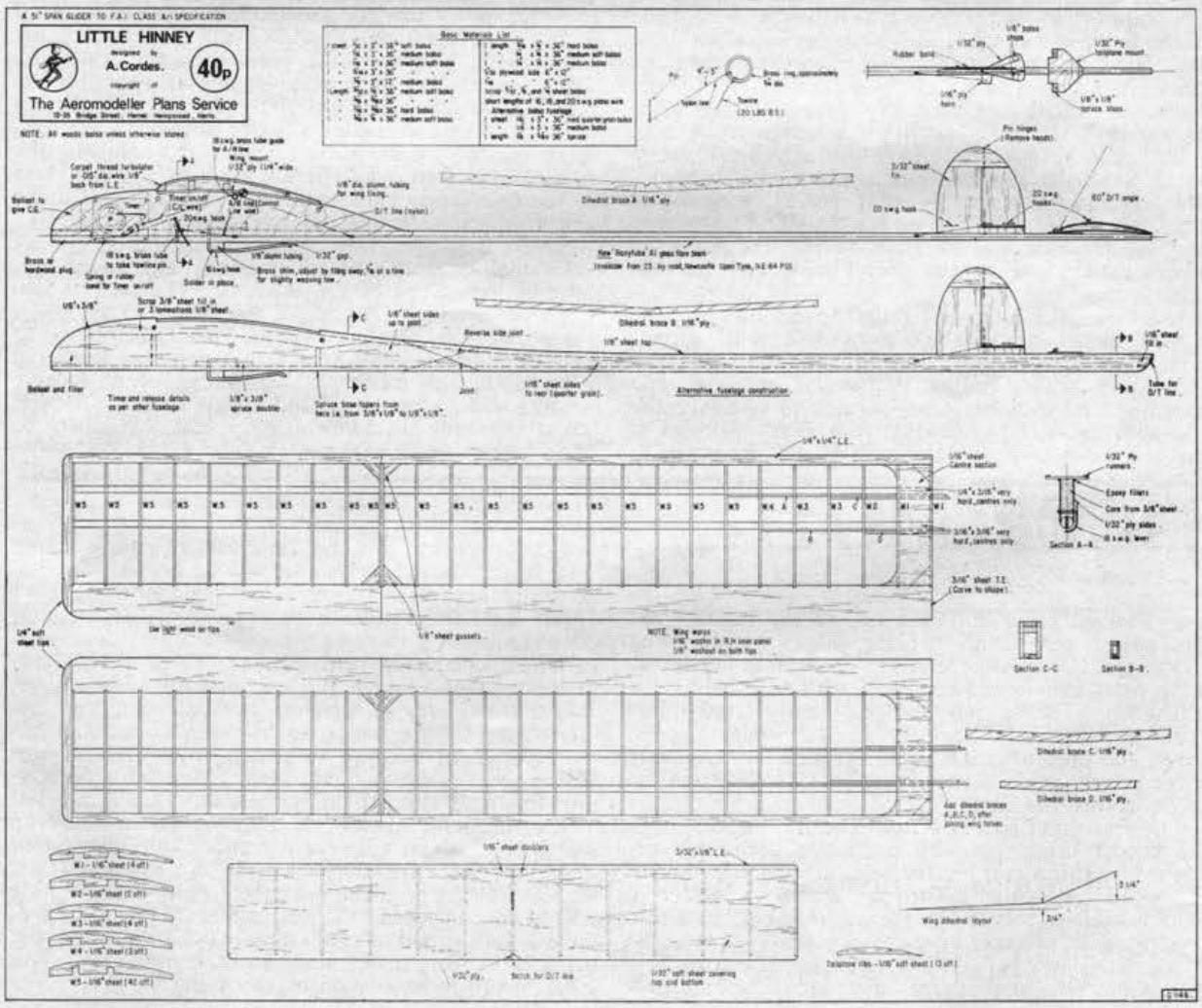
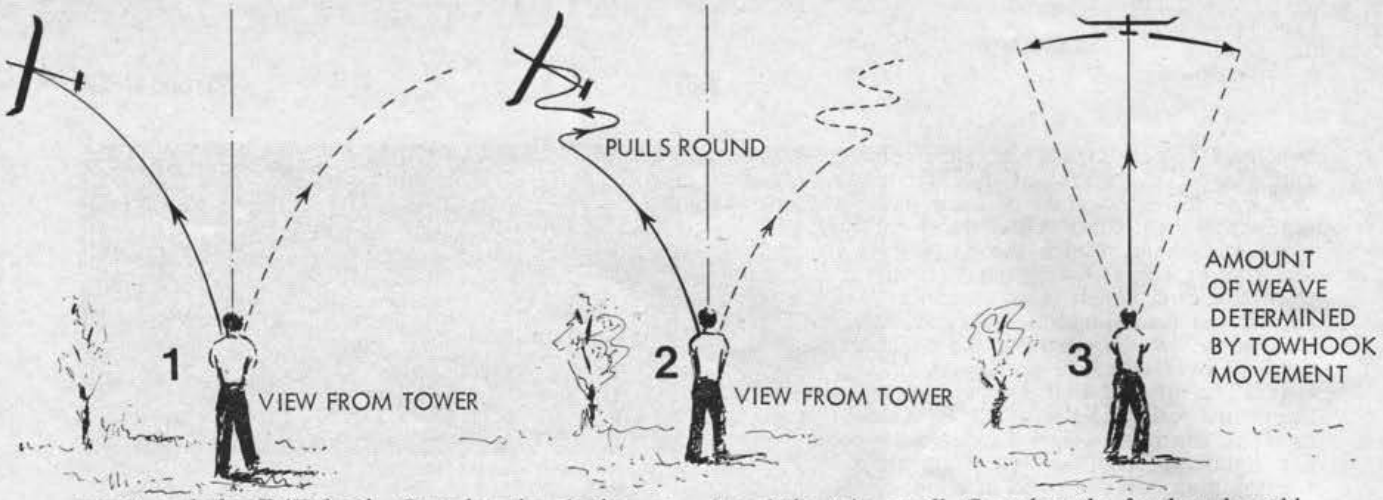




gusset and the D/T hook. Complete by doping on lightweight Modelspan or Jap tissue using the minimum of the three part dope. Sand as before with worn 600 grade wet and dry. The tailplane should weigh no more than $\frac{1}{4}$ oz. when complete. If the builder prefers a built up tail, for ease of construction and lightness, by all means use one. I would suggest multi-rib and a 1/32 in. sheet T-spar type.

As for the fuselage, cut the glass fibre tube to length, taking the surplus from the 'fat' end. Cut out the $\frac{1}{8}$ in. sheet pod and using the tube as a sanding blank, sand the pod to shape. Drill the 16 swg. holes in the blank to take the towhook. The towhook at this stage should only be partly bent to shape in that the portion of the wire which forms the outside of the hook is still straight. Epoxy the balsa pod core and partly finished towhook in place and when the assembly is dry carefully complete the bending of the towhook. Add the 1/32 in. ply sides allowing space for the D/T timer. (Note that if a fuse is to be used a snuffer tube may be added through the fuselage later). Sand the ply and pod structure to a streamline shape. Epoxy the ply wing mount, wing fixing tubes, autorudder, D/T lever assembly and brass wire plug in place. Cover the fin as per the tailplane before epoxying it to the tube. Finally add the tailplane mount.

Assemble the wing and tailplane on the fuselage at this stage and add ballast to nose until correct C.G. is obtained. Epoxy the ballast firmly in place and fill-in with Cataloy or similar material and streamline in with the fuselage structure. Cover the pod with lightweight Modelspan or Jap and finish to choice by painting or doping. It is not necessary to 'treat' the tube at all. Complete the fuselage by adding the D/T and A/R lines and soldering the small piece of brass sliver to the towhook.

Now for the trimming. firstly check that the wing incidence, C.G. and wing warps are exactly as per plan and that all surfaces line up correctly. Be patient and wait for a calm day.

Start off with about $\frac{1}{8}$ in. offset on the autorudder and test glide. Pack the tailplane and adjust the autorudder until a long flat glide with slight right turn results.

For towing, check first that the distance between the rear edge of the brass shim on the towhook and the C.G. location is about $\frac{1}{2}$ in. Using about 80 ft. of towline, *slowly* tow the model. If the model tows off to one side (diagram 1) and will **not** 'pull round', file away about 1/16 in. of the brass shim and try again. This is equivalent to moving the hook forward. If the model tows off to one side but **will** pull round (diagram 2), then use rudder offset to straighten the tow. Keep on moving the hook forward and adjusting the rudder until a straight, slightly weaving tow (diagram 3) results. Repeat now with a full towline and make any minor adjustments necessary.

Any variations in the amount of weave to suit individual taste can be obtained by movement forward or backward of the towhook. The farther forward the towhook the wider the weave. The model should now be in a set-up to follow the tower at will, even downwind if necessary. Adeptness at towing only comes with much practice. Remember to display a name and address label and always use a D/T even when trimming as *Little Hinney* just loves lift. So good luck in those mini-contests!

TIGER MOTH

Continued from page 136

the distances from the wing tips to the rudder post and adjust with small packing pieces on the wing roots until both sides are alike. The spaces left in the wing roots can be readily filled with soft balsa.

The wing boxes can now be finally fixed – slide these on to their respective tongues, offer up the wings and then when all is correct glue home, adding short lengths of 3/16 in. square balsa to buttress the boxes against the ribs.

The free-flight enthusiast is recommended to cover the model using the 'silk on tissue' technique described by Eric Coates in the September, 1971, issue of *Aeromodeller*, while R/C types would do better to employ nylon, due to its greater strength. In either case, the fuselage may be tissue covered.

All final fittings, such as opening doors, tinplate engine cowling, and sundry other details, should now be added before the model is finally ready for decorating.

Colour schemes for the Tiger are, of course, many and varied, but the modeller would be well advised to study both the *Aeromodeller* scale drawing 2681 (price 20p) and Profile Publication No. 132 for suitable ideas.

When completed and painted, fitted with four-function proportional R/C equipment plus engine, the original model weighed around 5 lb. and required no further ballasting as the C.G. worked out to be spot on. It may be remembered that full-size *Tigers* were generally nose heavy, the pilot occupying the rear seat when flying solo. This is a good point for scale models, as they so often finish up tail heavy, which requires a considerable amount of unwanted ballast to correct.

For transporting, the wings are readily detachable and it is suggested that end plates of ply or hardboard with small tongues are made to fit into the wing roots to keep the wings in their natural position and thus to relieve strain on the flying wires.

GOLDEN WINGS AEROMODELLER MODEL CLUB

Are you between 10 and 16 years of age? Then don't delay, join today

WINGSMEN, TAKE NOTE!!

JUNIORS WILL BE PLEASED to know that the S.M.A.E. intend to run no less than six **Junior Kit Contests** (Free Flight) this year, and possibly a postal contest as well. This is because 1972 is the 50th Anniversary of the formation of the *Society of Model Aeronautical Engineers* and a special Jubilee programme has been agreed.

Each contest will have its own prizes and each will be to the same rules. There is no reason why you cannot enter all of them, but the venues will hopefully allow everyone to enter at least one without too much travelling being involved. In addition, all winners will automatically be eligible for an overall S.M.A.E. prize at the end of the season – for the winner with the best performance.

The contests will be held at:

a) *Hullavington*, Wiltshire, on one day of the British R/C & C/L Nationals (May 27/28/29th).
b) *Strubby* (near Mablethorpe, Lincs) on one day of the British F/F Nationals (May 27/28/29th).
c) *Cranfield*, Bedfordshire, at the South Midland Gala, September 17th.
d) Northern Area Model Flying Rally, September 3rd.
e) Northern Gala, October 8th.
f) Southern Gala, October 29th.

(The postal competition, if held, will be sometime in mid-Summer.)

Keep looking in this column for details, but so that you can get started in plenty of time – any rubber-powered or glider **kit** with a wingspan less than 50 in. will be eligible. One major rule change is that you must be *under 16 years* old on the day of the contest(s) you enter. Fuller details are given below:

RULES FOR EACH CONTEST

Each contest to have separate Rubber and Glider sections.

Entry to be 15p per contest and this to cover entry to *either or both* sections (rubber and glider). Entry will automatically provide insurance cover for all flying of the contest models during the day of that contest. An entrant may use more than one model (of different kits if desired) for his flights, but only one entry per person per section is allowed.

The Models

1. Any Rubber of Glider kit whose wing span is less than 50 in. may be used. Models must be built by the entrant from a kit.
2. Models must be built as standard and the only modifications allowable are:
   a) Covering materials may be to entrant's own choice.
   b) Auto-rudders (on gliders) and de-thermalisers (on gliders and rubber) may be fitted if desired. Snuffer tubes must be used if fuse types of D/Ts are used.
   c) Amount and type of Rubber motor may be to entrant's own choice.

   (Note: the propeller and propeller-assembly must be as per kit instructions. If a propeller is provided in the kit, then it must be used unless the instructions indicate an optional alternative. If the instructions indicate how to hand-carve a wooden propeller from a blank, then the carving must be done by the entrant.)

Flying

1. Rubber Powered
   a) The Contest shall be held in two stages: the Qualifying Rounds and the Finals.
   b) For the Qualifying Rounds the Contest Director shall specify a 4-hour period within which each entrant can make up to 3 contest flights. The sum of the durations of these three flights shall be the Qualifying Round score for each entrant. A three-minute maximum shall apply to each flight. Flights under 20 seconds may be counted as 'attempts' and re-taken without penalty.
   c) Entrants must wind their own models (with a helper holding the model if required) and must launch them within 50 yards of the control point, downwind of the control point. Timing of a flight must be carried out by someone other than the entrant.
   d) The entrants with the top five scores of the Qualifying Rounds will go forward to the Finals. (Or all entrants achieving 3 x 3 minutes if there are more than five).
   e) The Finals will consist of two contest flights within a specified 1½-hour period and the highest sum of these two flights will determine the winner. (In case of a tie the entrants concerned will simply continue to make further single flights – still with three-minute maximums – until a clear winner emerges).
   f) All Finals flights will be timed with stopwatches and all models will be examined before being eligible for the Finals. This examination is to ensure that the model conforms to *Part B* of these rules. Should an entrant(s) be unable to enter the Finals because his model(s) do not conform with Part B of these rules, then the next highest Qualifying entrant(s) will be selected to make up the five Finalists. (The model(s) of this/these entrant(s) will also be examined as above).
   g) Entrants are advised to bring the kit plans and instructions with them in case clarification of points are required by the Contest Director.
2. Gliders

   As for Rubber-Power except:–
   c) Entrants must launch their own models. If a tow-line is used, then a helper must hold the model and the entrant handle the tow-line. Maximum tow-line length allowed is 50 metres (164 feet). Timing starts when the model leaves the tow-line. Launching must commence such that the helper releases the model at least 50 yards downwind of the control point but no further than 75 yards across-wind from the control point.
   f) As for Rubber-powered but tow-line lengths will be checked also.

Prizes

1. Prizes will be awarded at each contest for at least the winner in each section, and most likely for all Finalists.
2. In addition, at the end of the year, the S.M.A.E. will award a special *Jubilee Year Prize* to the highest-scoring winner of one of the contests in each section (scores in qualifying rounds will be used if scores in Finals tie).

Queries

Ray Favre is overall programme director and will be pleased to answer queries – 90 Courtlands Drive, Watford – if a self-addressed stamped envelope is enclosed. In particular, the degree of your interest in a possible postal contest to the same rules would be appreciated, you could fly anywhere and send your results in by post.

Dear John Bridge,

I am between 10 & 16 years of age and would like to become a member of the 'Golden Wings Club'. With this application I enclose postal order (International Money Order) for 25p to cover cost of the enamel club badge, two coloured transfers and membership card.

NAME IN FULL.....

ADDRESS .....

.....

YEAR OF BIRTH.....**SCHOOL**.....

NAME OF ANY OTHER CLUB OR CLUBS TO WHICH I BELONG (if any).....

SEND TO: **GOLDEN WINGS CLUB, AEROMODELLER, 13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTS.**

3/72 15p in the £1 Rebate plan purchase coupon for Golden Wing Members G.W. No.....

TURBULATORS are often used on competition free-flight models in order to improve wing efficiency, and they come in a variety of styles ranging from the simple piece of thread doped in place, to the series of triangular wedges stuck to the upper surface. This latter form of turbulator has the inherent disadvantage of being tricky and time consuming to cut out and place in position, but Martyn Prennell of St. Albans has a very simple answer sketched in **Figure A** – He simply uses a *Dymo Label Maker* to form a series of V's – the resultant self-adhesive strip can then be stuck to the wing. You could hardly find a quicker, more efficient, or simpler solution than that!

Returning to the hobby after a lapse of some 20 years, Mr. B. Gothard of Rotherham, Yorks., tried his hand at combat flying. Not surprisingly, after such a lay-off, he put a few models into the 'deck' – result, a pile of broken spray bars and bent needle valves. To overcome this problem he came up with this 'unbreakable' remote fuel control system. Firstly, he removed the existing needle and blanked off the hole with solder. Then an old three-pin electrical plug was taken apart to provide the source of the brass collet, shown in **Figure B** – this being the end of one of the 'pins'. The collet is then placed over the fuel tubing and the screw replaced with a spring under its head to prevent vibration from loosening it off. To adjust, the screw is simply used to squash the fuel tubing, thus restricting the flow to the engine and leaning out the mixture. The idea has worked perfectly with an A.M. 2.5 c.c. diesel, and should work equally well with any engine.

Finding a ready-made fuel tank to fit in a restricted space is never easy, as Graham Smith of Sutton Coldfield discovered while searching for a suitable item for his R/C Puss Moth, which featured two formers just 3 in. apart. His local model shop could not produce a 2 oz. tank short enough, so a rummage was made through his scrap box until a 'Jif' plastic lemon was unearthed. This fitted perfectly and was soon adapted into a tank, as shown in **Figure C.** A hole was drilled in the top for a filler pipe, plus one in the cap for the feed. The holes were drilled to provide a tight push fit for brass tubing to prevent the necessity of glueing them in position. Push a pin through the top to form a breather hole, and the job's complete. The tank is sufficiently transparent for the fuel level to be seen, and could be easily adapted as a handy priming bottle.

H. E. Fairhead of Boreham Wood, Herts., has a novel way of producing practical, tough wheels for his scale models, which is illustrated in **Figure D** and does not rely on being able to find a rubber ring of the correct diameter and cross-section. Basic construction is from a tin can (a 2 in. to 1 ft. Sopwith Pup uses a 'dried milk' tin), separating the bottom from the can leaving a lip about $\frac{1}{4}$ in. deep which will finish up as the wheel or rim. The centre of the bottom is then cut away completely to within $\frac{1}{4}$ in. of the edge. A chamferred ply disc is screwed and epoxied to the tin followed by a further, thicker ply disc in order to give the correct hub thickness. This disc is also chamferred, after which the wheel is centrally drilled and bushed. The wheel well is very easily formed by carefully beating the rim, whilst held, on to a small dolly secured in a vice.

The tyre consists of plastic clear fuel tubing (as used at the carburettor of some cars), and is cut to the right length by trial and error. A short length of smaller diameter tubing is then epoxied inside the joint area of the tube, and this is now the tyre. A most realistic finish is obtained when the tyre is glass-papered all over and then painted with grey and black streaks intermingled whilst wet. The tyre is epoxied into place on the rim. Canvas wheel covers are made from a circle of card, suitably trimmed, and the spoked effect represented by drawing radially on the reverse side with a ball point pen at the correct intervals.

Simple solution to an annoying problem is provided by Trevor Faulkner of Sheffield, (see **Figure E**). Ever tried soldering a washer 'squarely' on to a piece of piano wire? Result is usually a frustrating angle! The remedy is to make the washer an 'interference' fit on the shaft by tapping the inside edge with a punch to raise a slight pip at approximately 120 deg. intervals. The washer can now be forced on to the shaft and adjusted for exact positioning before soldering – taking care not to touch the washer with the iron, of course: a flame is better. The punch may be simply a masonry nail ground to give a small flat at the tip.

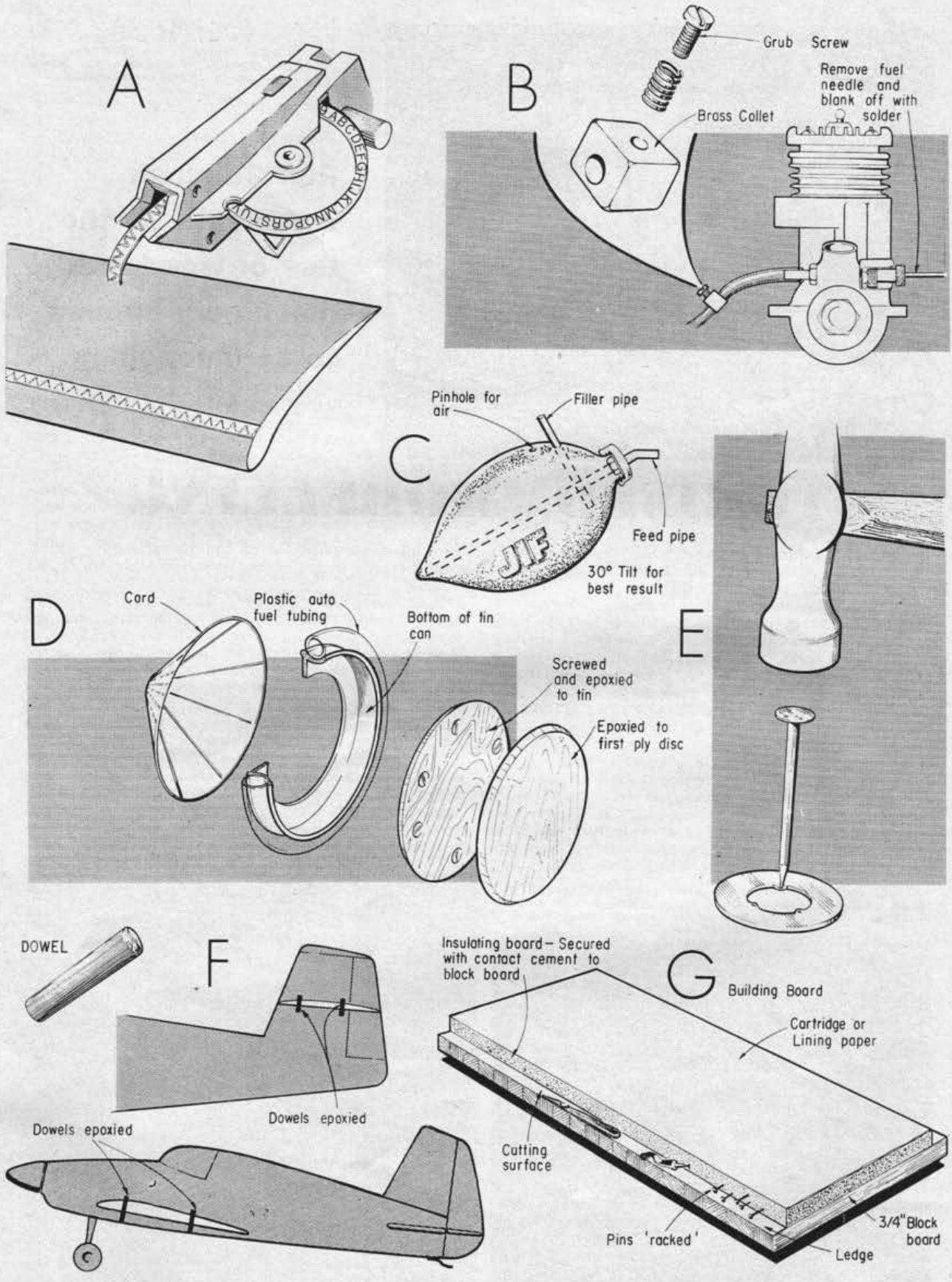
A profile Goodyear racing fan, G. Goddard of Wakefield, Yorkshire has found a neat method of reinforcing the vulnerable wing/fuselage joints on these models – he simply drills holes vertically through the fuselage and wings **(Figure F)** and then epoxies wooden dowels in place. The same principle can be applied to vulnerable tailplanes such as on the *Ginny* which is high-mounted. This dowling greatly stiffens and strengthens the joints on any profile-type model.

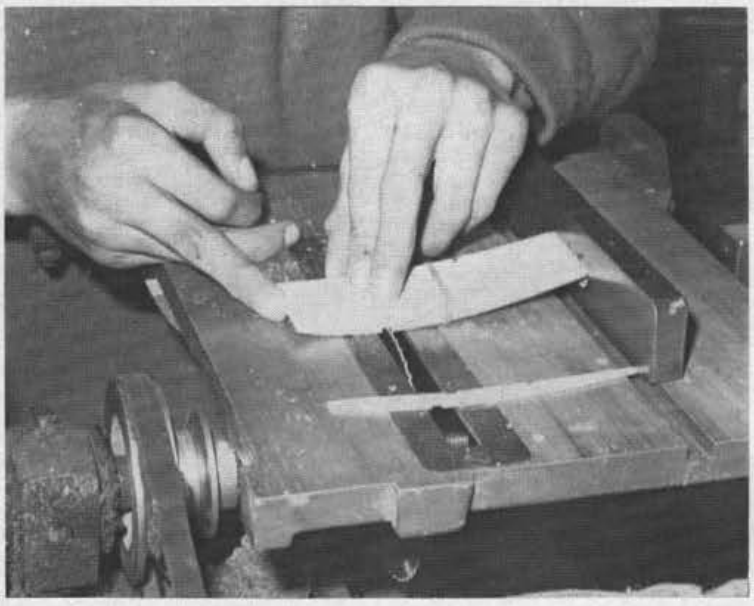
Another piece of advice from Trevor Faulkner concerns a long-term building board **(Figure G)**. A length of insulating board is bonded to some $\frac{1}{4}$ in. blockboard with impact adhesive – the lengths of the boards being dependant on the builder's requirements. Make sure that the blockboard is wider than the insulating board so that a ledge is formed either side. A piece of cartridge paper is then fixed to the top with Polycell or similar paste so that it can be removed by dampening after it has become worn. The ledge allows pins to be conveniently housed for use and storage whilst its surface can be used for small trimming cuts – a strip of hardboard renovates this surface when worn.

Many experienced modellers draw 'guide lines' on their boards to act as reference lines – different coloured ones give alternate matrices on one surface (e.g. wings and tail). When building from plans, polythene sheet may be stapled or pinned over the drawing to prevent the glue from adhering to them.

GADGET REVIEW

Readers' hints and tips


A
B
Grub Screw
Brass Collet
Remove fuel needle and blank off with solder
C
Pinhole for air
Filler pipe
Feed pipe
30° Tilt for best result
JIF
D
Card
Plastic auto fuel tubing
Bottom of tin can
Screwed and epoxied to tin
Epoxied to first ply disc
E
DOWEL
F
Dowels epoxied
Dowels epoxied
G
Insulating board – Secured with contact cement to block board
Building Board
Cartridge or Lining paper
Cutting surface
Pins 'racked'
3/4" Block board
Ledge



The author shows how a stack of ribs are slotted for the spars by passing over the saw blade – naturally, the ribs were produced by sanding down with the power tool as described in the text!

Ron Coleman comments on the use of woodwork machinery applied to aeromodelling

MOTORISED MODELLING

THERE CAN BE FEW households in these 'Do It Yourself' orientated days which do not possess an electric-powered portable drill, yet few modellers seem to employ them in their building programmes, despite their many uses. Perhaps this is because these devices are normally associated with purely drilling and sanding tasks, which can be rather too coarse when applied to balsa wood. However, a relatively small capital outlay will provide a circular saw attachment which can be used most successfully with even thin sheets of balsa, greatly speeding up one's building rate.

A fine-tooth saw which makes a kerf exactly 1/16 in. wide should be obtained – a suitable 5 in. diameter saw may be purchased from most ironmongers, while Messrs. Atkinson & Co. (Saws) Ltd. of Bower Street, Sheffield 3 manufacture an ideal blade. Remember at all times that a power saw can be extremely dangerous, so watch your fingers and turn off the equipment at the power source whenever the tool is not in use – even if only for a few seconds.

Why use a saw anyway? Tasks such as slotting fuselage formers for longerons can be rather tedious, particularly when they are small (i.e. 1/16 in. x 1/16 in.) such as is found in kits for rubber-powered scale models. These formers frequently feature many closely-spaced slots which need great care to cut out with a really sharp craft knife, but even so they frequently split off across the grain. The use of a small slotting jig with a fine-toothed circular saw makes the whole operation easy and rapid, with none of the characteristic wood-splitting across the short grain – the fine-toothed saw at high speed cuts across balsa grain very cleanly. A complete set of formers for a typical small or medium-sized scale model may be slotted in 5-10 minutes using this system.

This jig (illustrated in Fig. 1) provides an inclined table which allows the formers to approach the saw as a radian of that circle – thus providing a square

The jig, pictured below and illustrated at right, needs only to be produced from scrap materials – just ensure that the angle of the working surface is correct to produce a 'square' cut.

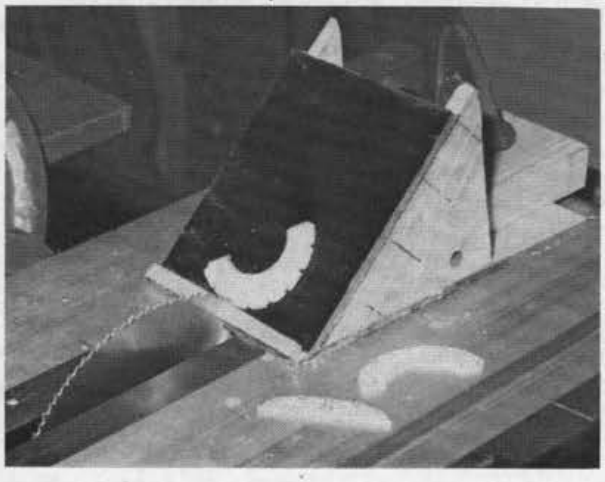
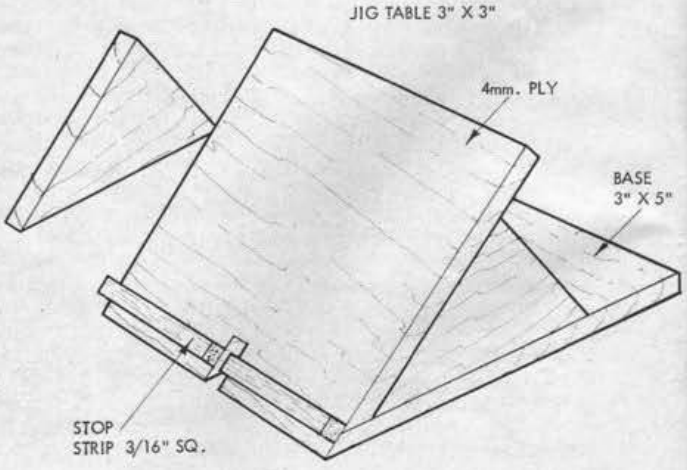


FIG. 1. SLOTTING JIG CONSTRUCTION



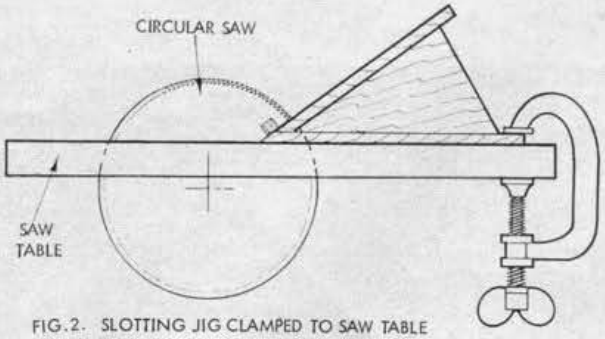


FIG.2. SLOTTING JIG CLAMPED TO SAW TABLE

cut at the bottom of the slot. It can be made from any scrap materials such as thin plywood, hardwood or ordinary softwood, altering the dimensions to suit the thickness of the materials used. Glue all the parts together with a P.V.A. adhesive as well as using panel pins or screws if necessary. Note that the stop strip consists of a piece of 3/16 in. square hard balsa.

To use, advance the jig on to the saw blade until the blade cuts past the stop strip by the depth of the slot required (in this example, 1/16 in.). Without moving it, clamp the jig securely to the saw table with a small 'G' clamp (see Fig. 2). The balsa formers may now be placed on the jig and advanced on to the revolving blade until halted by the stop piece – a clean 1/16 in. square slot results each time. Naturally, the slot may be deepened by advancing the jig further and widened by increasing the number of cuts taken to suit the larger wood sizes used for longerons.

It is often difficult to cut many strips of balsa (such as is needed for cross struts on free-flight models) to

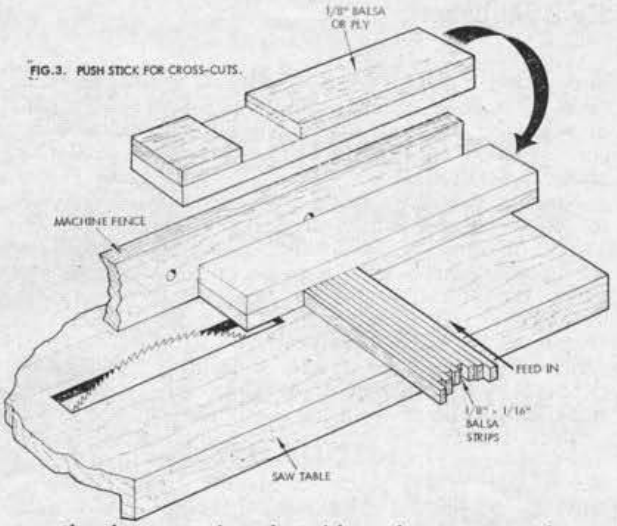


FIG.3. PUSH STICK FOR CROSS-CUTS.

exactly the same length, with truly square ends – so often the balsa knife is held off-vertical and a corresponding chamfered end results. However a simple push stick or jig as illustrated in Fig. 3 is a very convenient method of achieving innumerable 'perfect ends'. To make this, take a straight piece of wood the same width as the length of the required strips, and glue on the underside balsa sheet the appropriate thickness for the depth of the wood to be cut, leaving a gap between them to suit exactly a certain number of the strips – for example if 10 strips of $\frac{1}{8}$ in. x 1/16 in. balsa are to be cut at a time, then this gap would be $\frac{5}{8}$ in.

Line this jig up flush with the saw, then screw or clamp a machine fence (consisting of any piece of straight wood) to the table, exactly parallel to the saw blade. The slot is then 'primed' with the appropriate wood strip, and the jig pushed past the blade – result, ten perfect cross braces! Naturally this process may be repeated very rapidly.

While the sketch at right shows the ideal method of cutting equal-lengthed pieces of wood to size with square ends, the picture below illustrates a somewhat cruder but quicker solution – but mind your fingers and keep the wood square to the 'fence' when using this method. Power source shown in these pictures is rather a 'de luxe' item consisting of the Coronet Tool Co.'s Minorette Universal woodworking machine. Any normal household power tool can be used in conjunction with a saw table.

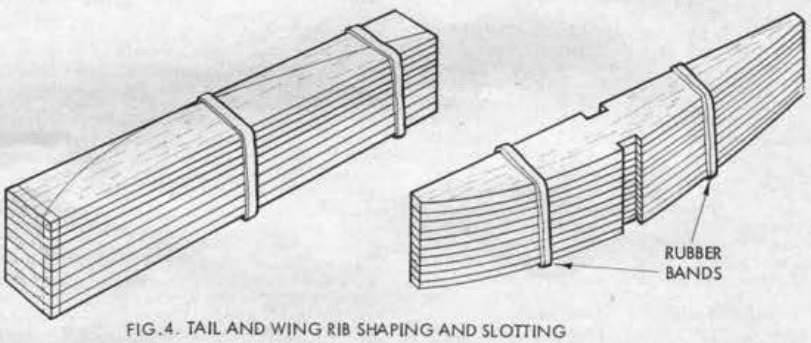
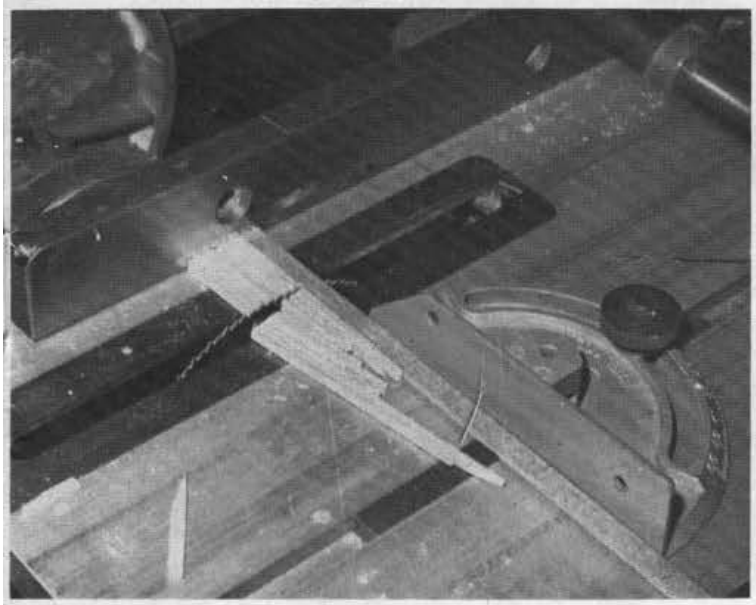


FIG.4. TAIL AND WING RIB SHAPING AND SLOTTING



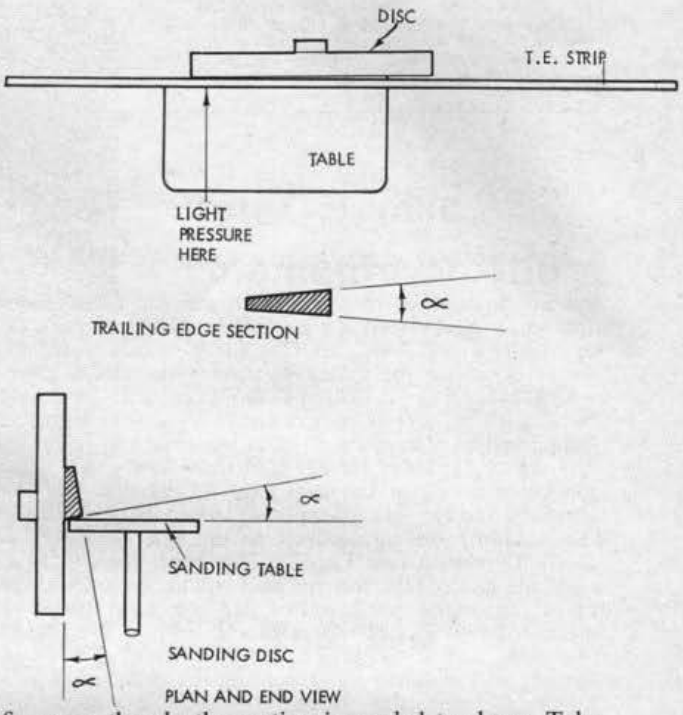
Removing the saw blade temporarily, replace it with the sanding disc fitted with a fine grade of sandpaper, and you are ready to produce wing or tailplane ribs. Make a stack of plain strips of balsa, drawing the desired section on to the top one, as in Fig. 4. Grip the pieces together in the fingers, ensuring that the bottoms are level by tapping gently on a hard surface, then shave off the majority of the surplus wood with a balsa knife. Taking care not to let the blanks slip (pins would be useful here), place the stack on the sanding table and work against the disc in smooth, flowing movements until the balsa is sanded exactly to the outline required. This action is very rapid and any heavy-handedness or attempts to rush the job will result in the infamous 'disappearing rib trick'! A stack of sixteen 1/32 in. ribs (such as for a lightweight tailplane (are quite manageable, with-

out getting out of vertical alignment. The upper contours of under-cambered wing ribs may be dealt with in a similar fashion, while symmetrical sections for control-liners are equally easy. The whole job takes about five minutes!

Now to slot those ribs for the spars . . . and back to the saw blade. Simply set the saw table so that the correct amount of saw blade protrudes to suit the spar depth (check with a piece of scrap wood) and clamp the 'fence' to the required distance from the leading and trailing edges. Now pass the complete set of ribs across the saw to produce a slot 1/16 in. wide – make two passes for 1/8 in. wide, three for 3/16 in. slots, etc. Use thin rubber bands or pins to hold the stack firm while re-adjusting the fence between passes.

More uses for the sanding disc include shaping such items as nose blocks on rubber-powered models, for which, use an F2 grade of glasspaper to avoid removing too much balsa, while taking care of the harder edges of thin plywood facings very easily (Fig. 5). When the glasspaper is new there is no need for preliminary work with a balsa knife.

With a little practice, the sanding disc can be made to produce tapered trailing edge sections very efficiently. A length of 3/8 in. x 3/32 in. balsa can be turned into a 3/8 in. x 3/32 in. x 1/32 in. section in 3-4 minutes, all ready to slot for ribs (by saw, of course!). To do this, it is necessary to apply the strip balsa at a slight angle to the front edge of the disc, so that the rear edge of the disc, rising up and away from the table misses the balsa. By drawing the strip steadily to the left while maintaining pressure with a finger or thumb, the section is sanded to shape. Take care to make the true triangular section by canting the strip over at an angle (Fig. 6). This is all a question of touch, steady pressure and maintained angles, plus a consistent rate of feed across the edge of the disc. After some trial runs, on scrap balsa, no great difficulty should be experienced.



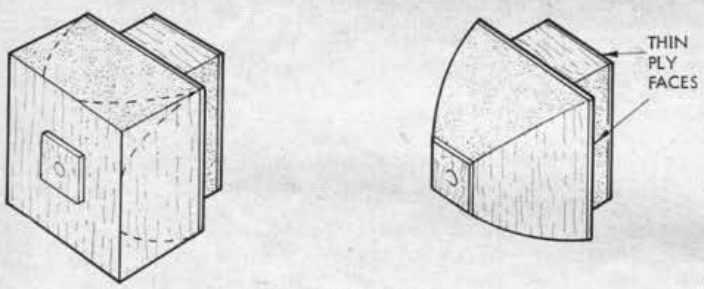
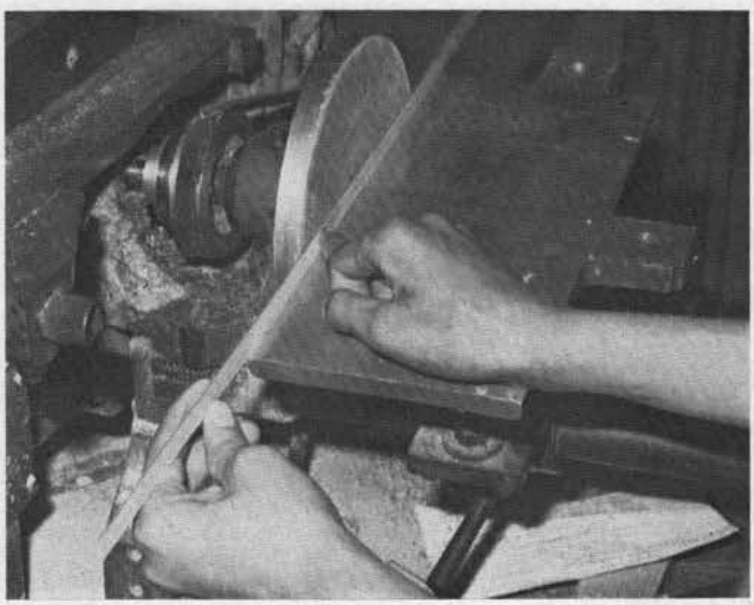


FIG.5. NOSEBLOCKS

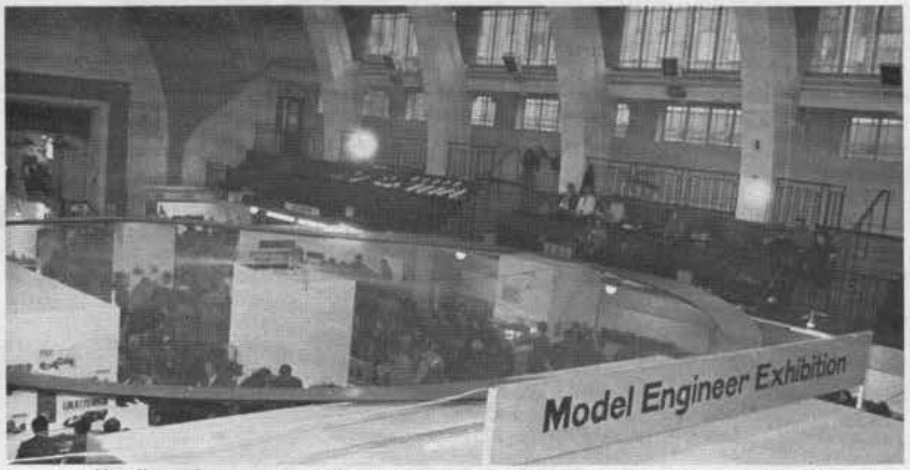
In conclusion, the author has found that power tools can provide a quick, accurate 'service' to modellers when just a modicum of thought is applied – and if it seems a little 'long-winded' to make a jig, then remember that these items are very simple and hence quick to make and, of course, may be used over and over again. Once one has become accustomed to using these techniques, then other uses will no doubt become apparent, it just needs practice!



The work illustrated in Figure 6 being put into operation. Although this operation may seem fraught with difficulties, a little practice on scrap wood will soon allay these fears. Chief advantage, apart from speed, is that non-standard size of trailing edge stock may easily be formed without much laborious 'elbow work'. Note how pressure is applied only to the 'leading edge' of the sanding disc – finger pressure and angling is all-important here.

MODEL ENGINEER EXHIBITION '72

Seymour Hall, London Jan 4th-14th



Heading picture shows the elevated track for the electric powered round-the-pole models, which stretched from balcony to balcony permitting 25 ft. lines to be used. While the netting protected both visitors and models from damage, retrieval was a little dangerous at times! Models remained airborne for periods of at least 15 minutes without overheating the motors.

Mike Staples proudly displays his Championship Cup-winning control line Miles Magister, built to a scale of 1½ in. to the foot. Power is by an O.S. 19 R/C operated by a third line. The weight is just 32 oz. – quite an achievement for the amount of detail included.

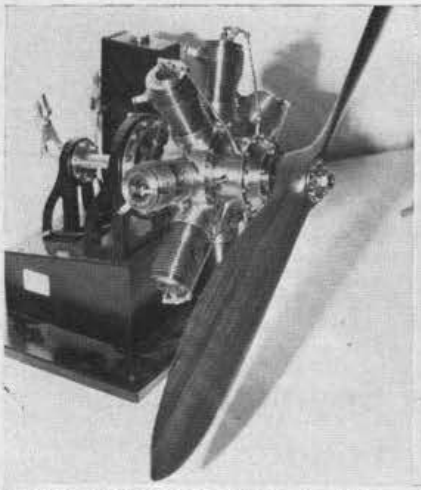
The nicely 'weathered' appearance of Bill Miles' Hurricane Mk. I helped to gain it a 'Very Highly Commended' certificate. Scale is 1⅞ in. to the foot. Merco 35 will haul this 5¾ lb. control-liner.

THE PHRASE 'Bigger and Better' is an overworked cliche, but this year's Exhibition certainly deserves the title. With more 'show space' available, thanks largely to the use of the swimming pool as a boating marina, an elevated take-off strip for the now familiar electric powered round-the-pole models (enabling 25 ft. lines to be used) and a record total of more than 46,000 people attending, it was certainly a great success. The only 'failure' perhaps, and indeed most disappointingly, was the low entry in the flying model aircraft section. Not one radio controlled entry was received while several other promised models failed to materialise. With the numerous excellent scale models to be seen at any club meeting or rally (or indeed any form of flying model) why so few entries? Remember, it is not just the judges who must be pleased – its the General Public. The vast majority of those 46,000 visitors have probably never seen a model aircraft – and they need educating! A big display of moderate to excellent models could produce an excellent piece of P.R.O. work for the movement – and the opportunity is there for the taking. Make a real *effort* for next year!

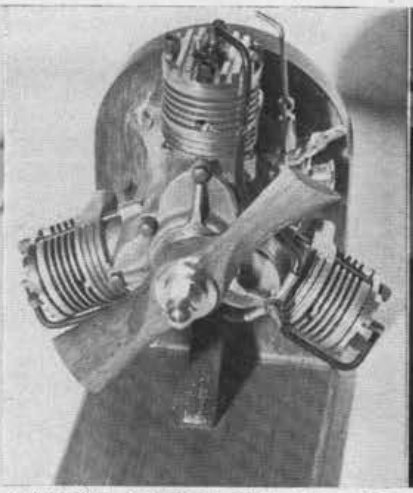
Enthusiasts of 'solid scale' modelling who decry the work of their counterparts who use plastic as a medium should have taken a look at both the display cabinets and the International Plastic Modellers Society's stand. What an eye opener! Unless you study the models really closely you may well overlook the skill put into these miniatures – so many are commercial kits modified to such an extent that they are almost originals. Versions of the Airfix Spitfire were understandably profuse, most with additional opening hatches made from plastic card while one ambitious montage depicted an airframe having a complete refit, including the engine being lifted out on a winch! For real perfection though, how could one criticise Tony Woollett's De Havilland 84 Dragon – built entirely from 'scratch' using plastic card, and complete in every detail.

Of the flying models, Mick Staples' control line Miles Magister certainly earned its Cup award – the construction and finish being impeccable, complemented by full instrumentation and opening doors. This will probably form Mick's entry for the World Scale Champs team trials, where it will stand more than a fair chance. Another scale entry was by Bill Miles of the Three Kings Club whose Hurricane sported a well executed 'weathered' finish and is a replica of a machine which crashed near his home town of Croydon. Retracting undercarriage was planned, but a sudden growth in weight has caused this idea to be temporarily shelved. Scale models are not essential at this exhibition – indeed Martin Dilly's pair of neatly executed designs brought envious re-

At right, ducted fan r.t.p. Lockheed Lancer by Graham Hughes, of Coventry DMAC, did not take too kindly to 25 ft. lines, though it flies well on a short radius in the club room.



Superb engineering evident in John Loudon's 1/5th scale 1913 Gnome rotary engine which swings an 18½ in. diameter prop. All parts were machined from solid in nearly two years of spare-time work.



Interesting 3-cylinder glow plug motor by Graham Kimber features three crankshafts, each supported on two ball-races, the final drive being via a 1:1 gearing. With a capacity of .48 cu. in., it turns an 11 in. x 6 in. prop at 8,000.

Irrepresible Martin Dilly not only helped man the S.M.A.E. stand, but also entered a pair of beautifully finished free-flight jobs – the power model earning a Commendation from the Judges.

actions from lesser builders, the ½A model receiving a 'Highly Commended' award from the judges, while the sheer size of John Haggart's vintage Firebrand model, complete with Vivell spark engine, stirred many hearts.

The Society of Model Aeronautical Engineers stand, depicting its Golden Jubilee year, found a roaring trade selling North Pacific chuck and rubber powered kits to the young, picking up new members as well en route. Demonstrations by Mike Fantham's Easy B indoor tissue jobs provided much amusement to the fascinated public in the evenings.

Throughout the period of the Exhibition there was, of course, the electric r.t.p. models in almost continuous operation benefiting greatly from the increased line length now possible. The pylon equipment loaned by the Grantham club proved most reliable and allowed up to four models to be airborne together, although this did tend to make the pilots' adrenelin run rather high! Combat flying, however, proved eminently possible, and even if a few tangles did develop, at least the crowd appreciated it. On the Saturdays up to 40 such models were evident, ranging from twin engined machines through scale types to an Autogyro. Many individuals and clubs brought along models to have a go, although not all were used to the longer line lengths. Next year aerobatics? Well perhaps. . . .

Top left: Superbly modified Airfix 1/24th scale Spitfire Mk. I by D. Bailey features full internal detail, including all engine wiring and plumbing, etc., even additional opening inspection hatches. Below is Tony Woollett's incredible scratchbuilt D.H.84, finished in the markings of Hillmans Airways, while beneath that are a pair of Focke Wulf 190s, modified from commercial kits. In the rear, 'Mac' Kennaugh's D9 variant, in the foreground, Bryan Philpot's A8 – placed 5th and 3rd respectively in the 'solid's' section.

CLUB NEWS

Really impressive array of trophies belonging to the S.M.A.E. consists of (back row) Farrow Shield, Model Aircraft Trophy, Plugge Cup, Lady Shelley Cup, Gamage Cup, Womens Cup, Aero Modeller R/C Cup, Snr. F/F Championship Cup, Gold Thophy, Jetex Cup, S.M.A.E. Glider Cup, Caton Trophy, Premier Shield. (4th row) White Cup, Taplin Trophy, C.M.A. Cup, Model Engineer Cup, Whitney Straight, K. & M.A.A. Cup, Frog Snr. Cup, K.L.M., Sid Allen, Budapest Trophy. (3rd row) Pilcher Cup, M.A. Speed No. 1, 2 and 3, P.A.A. Cup, Wharfdale Cup, Super Scale Trophy, Thurston Glider Cup, Frog Junior, M.A. Speed No. 4, 5 and 6, Heather Cup, Davis B Cup. (2nd row) U.K. Challenge Cup, Gutteridge Trophy, Halfax Trophy, Knokke No. 1, Aero Modeller Power Trials Trophy, Astral Trophy, Aero Modeller A/2 Cup, R.A.F. M.A.A. Cup, Knokke No. 2, Sir John Shelley, RipMax Shield, (front) Flight Cup, Weston Cup, Keil Trophy, S.M.A.E. R/C Trophy, Davis A Cup, Houlberg Snr., Houlberg Jnr., Eta Cup, Hamley Trophy, Radio Modeller, Quickstart Trophy, Short Cup. Fancy cleaning that little lot, then?

THE NEWSLETTER of the **Maidstone M.F.C.** discusses one of the perennial problems of club life: the extent to which a person commits himself by becoming a member. Often he is exhorted to join a particular club, and feels he is under no obligation beyond adding his name to the membership list and paying the required dues. It may well be that he desires only the minimum of social contact, and all that he really wants is the occasional use of the flying facilities and the insurance cover that his membership sometimes acquires. The trouble is, the people who run the clubs do so for other, more social, reasons than the mere provision of model flying facilities to a number of unconnected individuals, and if, in this day and age, people are concerned less with the 'clubbableness' of clubs than with the special amenities they offer, then we move into a more professional situation where the voluntary services of club leaders cannot be accepted gratis. However, as far as the Maidstone club is concerned it is just a matter of whipping up a bit more enthusiasm amongst members, and, pointing the way, is Noel Lovatt, who has won two prizes in outside contests with his *Bristol Scout*. Mr. V. M. Cook is vacating the editor's chair after two years of service, but intends to continue as an active contributor.

The **South East Area's** *Seadog* opens with yet another tribute to the late Fred Boxall, who, up to a month or two of his untimely death was an almost institutional figure on the free-flight scene. Two things I particularly admired about Fred. One, the way he demonstrated how you could achieve success without too great an addiction to current trends, and the other, more important, was that he seemed to regard a model event as a social day in the open rather than a 'win at all costs' glory hunt. Most of the contest news in it covers the latter part of 1971, and it all seems encouragingly active, although, no doubt, an increase in entries, free-flight in particular, would be welcome during the coming season. A. Grantham emerged as the Area Free-Flight Champion, whilst in the R.A.F.A., Shield, K. Winstanley was top in Glider, E. Gravett in Rubber and J. West in Power. Perhaps it is significant that, in a corner of England, where flying space is so hard to come by, there is much news of Slope and Thermal flying activity. Many free-flighters have found the radio glider an acceptable variant form of flying where space restrictions have clobbered the long ranging F/F machines. Some of the radio gliders particularly the multi-stunt, are highly developed instruments, and it was, apparently, amusing at one event to see the winners awarded with beginners kits as prizes. Finally, congratulations to Mr. Ian Lucas, the Chairman of the South East Area Committee, and an active model flyer for 35 years, has been awarded a Fellowship of the S.M.A.E.

The newssheet of the **Watford Wayfarers M.A.C.**, gives news of a warmer relationship between members now that the heat has been restored to the clubroom. This made for pleasant viewing of the film on French R/C activities on which Mick Wilshire gave an enlightened commentary (*Sacre Bleu* had nothing to do with the colour code). This was followed by a film of the homespun antics of club members on the moor, and, not too ominously, we hope, a discussion on silencers. A funny thing about silencers, I find is that the bloke who doesn't use one seems to do most of the flying! The newsletter goes on to comment on the big birds which are all the rage at the moment. There is, for example, Tony Rose's *Barnstormer*, and Peter Valentine's new birdlike, moving gull wing, multi glider. Altogether quite a promising amount of winter whittling going on.

The December issue of the well produced *Marsh Gas*, newsletter of the **South Essex M.A.S.**, has a few witty but thought provoking things to say about the Christmas present hand out. How many of you got landed with a non-essential woolly scarf, a duplicate set of string gloves or a centipedal flurry of socks instead of that Deac or servo you coveted? And this raises the whole question of whether the model flyer gets the same bonuses from the family budget as other hobbyists. Just think what some blokes spend on cameras, tropical fish, golf clubs etc., in the accepted belief that these things are an essential staple of life, although looking around, radio comes well up the family shopping list. A free service provided by most clubs is radio tuition. Chris Clarke, who advises on how to get that first radio model safely airborne counsels the tyro pilot to 'hang about' on the flying field for one of the experts to take him on to the nursery slopes. For the newcomer to propo flying Chris recommends a high or shoulder wing model with plenty of wing and tail area, a symmetrical wing section, a 49 or 60 motor and a trike undercart. Initiation flights come easier if the gear lacks idiosyncrasies such as opposite aileron movement, and if everything is rigorously checked out before you leave for the airfield. Coming to another article, this time on Single Channel flying, I concede the writer is correct in decrying the lack of hold and penetration that the lower power, low weight model has in windy conditions, but I can't help feeling we already have too many potentially dangerous heavies knocking around. For my part it makes a nice change to see the lighter machines doing their languid stuff on the calmer sort of day. Want to join this very progressive club? Then telephone Southend 87633 or 43190.

More news of that much vaunted *Military Air Trials Rally* given in the newsletter of the **Flying Druids M.A.C.** A progress report given at the club A.G.M., divulged that the Military Trials simulation would form part of a general Scale rally. Let us hope that the main purpose of the meeting, the get together of the 1912 craft, will not be smothered by too much general activity, although, obviously the content might well have been too thin without a little general padding. Quite a respectable turn out for the A.G.M., comparatively speaking: approximately half of the fifty odd members putting in an appearance. Reports were all reasonably encouraging with the club being well in the black financially. If there was one secretarial grumble, it was the ancient one of the same people doing all the work.

There is a cheeky reference in the **Three Kings Aeromodellers'** newsletter to control liners being just frustrated radio control flyers. Without taking this remark too seriously the club is nevertheless going to quizz its forty odd control line members on just why they stick to good old steam control lining in this electronic age. Many, it is known, have tried Radio but have found it wanting for one reason or another. It will be interesting to learn what the members

have to say. Personally, I am all for a bit of diversity. Wouldn't be much fun if aeromodelling became stereotyped into an all radio clambake. Raised at a recent club meeting was a proposal to make the club an all S.M.A.E., affair. Thought to be a desirable attainment, but faulted on the grounds that it added too much to the financial burdens of the newcomer, who could join the S.M.A.E., when he felt he had a real need for it. This raises the question of just how relevant is the governing body to the vital interests of the average club flyer. Oddly enough it is the fly for fun radio man who seems to have the least use for the society, although without a representative body to speak on his behalf he could be prey to all sorts of unpleasant restrictive measures from the curtailing of frequencies to widespread flying bans.

Mr. P.W. Maddocks, P.R.O., of the **Esher & D.M.F.C.**, has sent along a copy of the new club magazine, *Airflow*. A very sumptuous publication this, with a glossy cover and a bulky content, but the editorial trick, of course, is to keep up the flow of contributions after the first flush of enthusiasm The Esher club would appear to be mainly a radio group, with most of the newsletter comment and articles dealing with that aspect of the hobby. One article, a cautionary one, tells how an apparent slight misjudgment in landing a radio model resulted in a lady sustaining a broken ankle, and the flyer an even more broken model. Point of the story is that the model had actually landed prior to the incident. What the result of a full flight collision would be does not bear thinking about. The incident has strengthened the resolve of the Esher boys to get their own flying field where control over planes and personnel can be exercised over the whole flying area. When you look around at other people doing radio, you often envy them their magic touch, but according to an enlightening article by the editor, Mr. Maddocks, very few radio flyers are all that successful. Although a modeller of considerable experience, and not a little success, he encountered his full share of setbacks and crack ups, and is of the opinion that many radio novices find the cost of learning much too high, and drift off into other interests as a consequence. But if radio has its share of problems, these can be minimised by joining a club, where you can have those radio faults ironed out and given a hand in getting your model safely airborne.

Arthur Gorrie, who is hon. sec. of the **Newtown Model Aeronautical Association**, (Australia) writes to tell us that the association is to operate an incentive scheme to encourage members to participate in as many Queensland State events as possible. Awards will be given to top scorers in a given number of free-flight and radio events. It is doubtful if a similar scheme over here would operate to any great advantage. Mostly the people who do the top scoring are of the type who endeavour to enter all the principal events in the calendar anyway, and possibly the only incentive they would welcome on occasion is the cost of the day's expenses.

Airmail 71 is the newsletter of the **Sevenoaks & D.M.A.C.** From this I elicited that the club membership is fairly substantial: thirty seven turning up for the club's A.G.M. The club also appears to have a new flying field. Fees are £6 per annum for senior, and entrance fee is £3. Radio appears to be the operative word.

The question asked in *South Island News*, which comes from Christchurch, New Zealand, is 'Too Much Technology?'. Top contest people both in Radio and Free-Flight, now seem to use specialised gadgetry as basic contest equipment. In Radio, retractable undercarts seem to have become a must on the Pylon circuits, and in Free-Flight there are circling tow hooks and variable incidence surfaces. But, as pointed out, the free-flight gadgetry, although of value, is not absolutely essential for success. And just by way of demonstrating this comforting fact the newsletter reproduces a plan of a very functional Swedish Wakefield. A plain square fuzz and not a gadget in sight, apart from a clockwork D/T, but a very potent performer nevertheless. The big event down under is the *Trans Tasman Trophy* with teams competing from the Antipodean countries. This is a minor international itself, with each country holding its own team selection trials. Distances, however, are quite considerable in that part of the world, and it's no mean journey that the New Zealanders will have to make to compete in Sydney.

Flying facilities of the **Christchurch M.A.C.**, (New Zealand) look good for at least the next fifteen years, according to an account given in the latest issue of *Torque*. The field at Yaldhurst is on lease to two gentlemen who kindly give it over to club use. It may be though that the club will have to pay a small rental fee in the future, but by way of compensation the club hope to develop the flying facilities over the next few years to a point where the first New Zealand Model Airport will be established. A reference in the newsletter to a one entry Coupe D'Hiver contest makes one wonder why the initial interest in this class of model has not been sustained. For some reason the serious free-flighters do not seem to regard it as a valid contest model. Perhaps the performance is just too low geared.

Still in the New Zealand area, we have the Christmas issue of *Flight Lines* to peruse. This is the magazine of the **Hamilton M.A.C.**, and gives coverage on both free-flight and radio – not to mention a spot of slope soaring. News here, too, of the Trials for the selection of the Trans Tasman team at Taupo. Entry was rather thin – something to do with the choice of venue and the time of year – but quite a high standard of flying nevertheless.

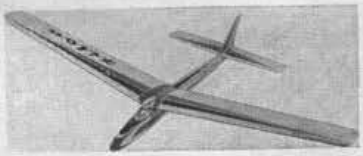
In a result sheet published in the Californian **San Valeers'** *Satellite* we got a surprising 16-entry item for the Coupe D'Hiver event at the 1971 San Valeers Annual. But, then, the Americans do seem to subscribe to a greater number of model classes than we would accept in this country. In the event just mentioned there were no less than six separate 'gas' classes, which is four more than we ever see. All the rage for retrieving in the States are small motorbikes as opposed to our plain pedal power. We over here might be pushed to find space to cart such items about, and perhaps pushed to find the money, but never mind, motor bike retrieving can be hazardous. Too much throttle and you have a broken wing, too much swerving and you have a broken neck.

A lively programme of talks and demos has been arranged by Dick Wilson, the secretary of the **Gravesend Aeromodelling Club**. Lectures will range from Pylon Racing to Slope Soaring, and in addition to film shows and quizzes it is hoped to give illustrated talks on finishing, radio installation, etc. Following the success of last year's W.W.1 flying displays the demo team is putting forward history a notch to give W.W.2 displays of *Spitfires, Hurricanes, Messerschmidts*, etc. It is hoped to get the show under way at the Kent R/C Airshow 72, and also in 1972 the club expects a greater participation in outside contests. Mr. B. Patterson, the P.R.O., who sends along this report also encloses a copy of the club magazine. A word in this on the thorny subject of subscriptions. These, of course, have rocketed from the old bob a month days, but seeing a modern list of club expenditures, including flying field rent and the higher S.M.A.E. dues, the £5 adult fee seems quite reasonable.

That's about all until next month.

Clubman.

Graupner



FILOU SAILPLANE £4.85
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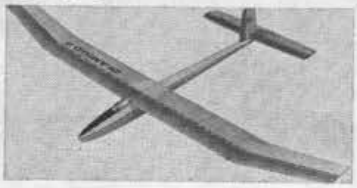

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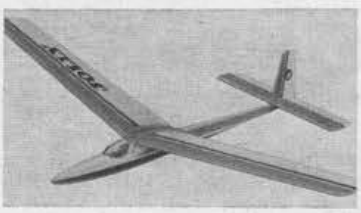

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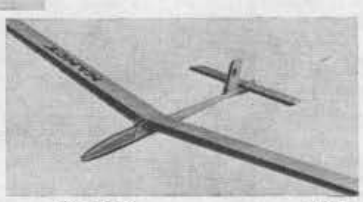

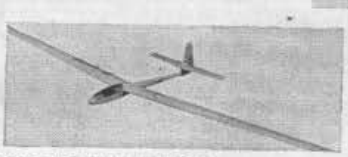

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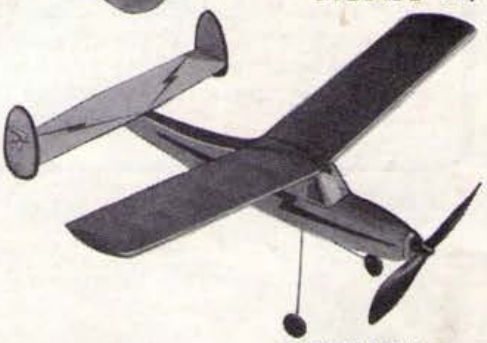

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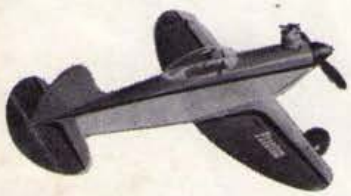

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