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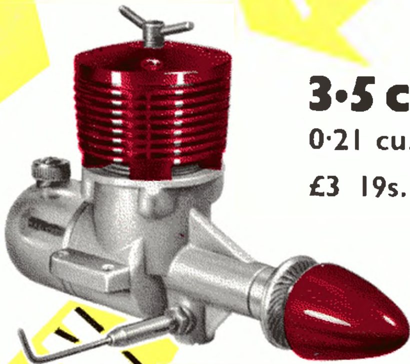

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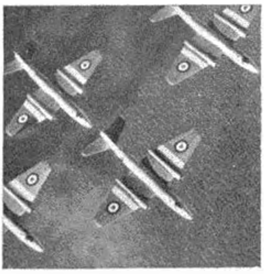

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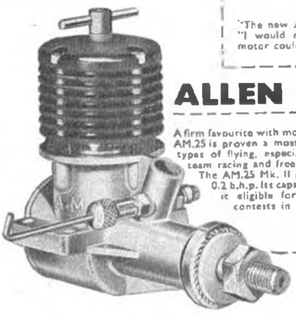

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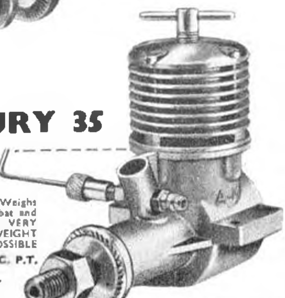

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AERO MODELLER

"Covers the world of Aeromodelling"

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MAY 1956

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Editor - - - - - - H. G. HUNDLEBY
Assistant Editor - - - R. G. MOULTON

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TELEPHONE: GADEBROOK 2351 (Monday-Friday)

# You and your Model Shop

COMMENT AT A recent meeting of the Federation of Model Aircraft Manufacturers and Wholesalers and in our own "Trade Notes" last month have centred around the service provided by retail model shops.

A widely held view is that many model shops do not carry the stocks they should, and therefore fail in their duty to the customer. This fact is confirmed to a certain extent by the Wholesalers who receive many "one off" orders, particularly for the more expensive items such as engines and radio control equipment. There is no doubt that some dealers do only order against a firm order from the customer, with the result that the particular product is never on view and consequently loses much of its sales potential.

Before our many friends on the retail side rise in wrath, let us hasten to add, that the above criticism certainly does not apply to all retail model shops. From personal experience we know the splendid service that many shops provide, and do appreciate that there are certain items of which they cannot reasonably be expected to carry large stocks. We do hope, however, that comment on the subject will result in all dealers examining their consciences, and more particularly, their stocks, to ensure that they are giving a real customer service and not drawing retail discounts for the mere privilege of passing on customers' orders.

In turn the customer, you the modeller, should pay your part by supporting the local model shop. Be firm in your requests which guide the shopkeeper, and when he stocks the goods you require, then support him by not buying elsewhere. Do not waste the proprietor's time by propping up the counter throughout his busy Saturday afternoons, yakking on modelling with the boys, and passing loud and uninvited comment on the purchases of other customers. This is a favourite pastime of the thoughtless few who are a blight on the local shopkeeper, and who invariably end up buying a 6d. tube of cement! If you can avoid Saturday shopping then please do so. You will be helping the model shop proprietor and yourself, as he will have more time on weekdays to devote to your personal requirements. Where your local shopkeeper is not an aeromodeller, then do guide him in your requirements. He should read the AEROMODELLER like yourself and any of the products advertised should be available over the counter. If not the fault may not lie with the retailer. Ask him to contact the wholesalers or manufacturers concerned, as the days of wartime shortages are passed and there is no excuse for late deliveries apart from strikes and other abnormal conditions.

Which reminds us of the unfortunate situation of last month's AEROMODELLER, delayed some 5 weeks through the printing dispute. Published on April 18th instead of March 15th, this April issue sold out completely in a matter of 5 days!

This magnificent support from our 48,000 readers helped by the co-operation of the model shops, touched our hardened editorial hearts. We thank you all most sincerely and have put forward our best efforts to ensure that future issues justify your faith in AEROMODELLER.

*On the Cover . . .*

Heralding a new era in military pilot training, the Hunting-Percival Jet Provost Trainer T. Mk. 2 brings high speed to *ab initio* flying training. This latest short undercarriage version is described and drawn in accurate detail on pages 248/9 of this issue. *Hunting-Percival photo.*

## Heard at the
# HANGAR DOORS

*Presentation of the A.T.C. Aeromodelling contest Trophies at Ilford was made by Air Commodore J. M. Cohu, C.B.E. who is seen between F/Lt. S. E. Thompson of No. 50 R.A.F. Recruiting Centre and Victor Ludorum winner, Sgt. E. A. Harris. Some of the entry, with individual Trophies is seen in foreground, while at left, Sgt. Harris poses with the collection gathered by his Kellkraft Ladybird, and outright winning A.P.S. Rubberdub*

### A.T.C. Modellers

A most encouraging aspect of Air Training Corps activity is the introduction of an annual modelling championship which for this year was open to 37 squadrons of the A.T.C. in Hertfordshire, West Essex and East Essex Wings. Eliminating contests at these Wings provided finalists for the judging of best models at Ilford on March 23rd, where the organising officers of No. 50 R.A.F. Recruiting Centre are located. There was much to be said for the standard of workmanship, bearing in mind the youth of the entrants, and model trade and press judges had difficulty in defining winners in two of the four classes. There was no doubt, however, that the efforts of Cadet Sgt. E. A. Harris of 1107 Squadron, W. Essex Wing, resulted in him winning free-flight power and rubber, and we are sure that the impressive array of trophies and other prizes will encourage an even larger entry next time. Indeed the trend of thought is that the contest might become open to all Squadrons, and held on a nationwide basis.

Air Commodore J. M. Cohu, C.B.E., who presented the trophies in the presence of the Mayor of Ilford and an appreciative throng of R.A.F. and A.T.C. officers, stated that aeromodelling was an ideal medium for encouraging more A.T.C. recruits, who are, of course, recognised as most suitable applicants for future service in the Royal Air Force. Flight Lieutenant S. E. Thompson, O.C. No. 50 R.A.F. Recruiting Centre at Ilford, is to be congratulated for his enterprise in stimulating this interest in the hobby, and in particular in obtaining such fine donations from the model trade, and aircraft industry. For winning the Victor Ludorum prize, Sgt. Harris will be the guest of Messrs. Kelvin Hughes for a very full day, beginning with a factory tour at 9.30, afternoon flight over his home from Southend Airport, and finishing with an evening at "Cinerama" in London.

### Wrong gliding site!

Mentioning the gliding centres in last month's "Hangar Doors", we stated that the Bristol Gliding Club operate at Lulsgate, and although that may have been true for last year, it is no longer correct. New site is in the heart of the Cotswold country at Nympsfield, just north of Bristol, and offers excellent hill soaring in addition to a runway length equal to that of Lulsgate. For those who have yet to decide upon their holidays this year, we can heartily commend a gliding course at this or the Surrey or Yorkshire sites.

### Congratulations are due . . .

With F.A.I. recognition of his 208 k.p.h. speed record for Class 1, Ray Gibbs now holds two of the four speed classes in the list of World records, and there is every likelihood of an attack on the 10 c.c. figure later this year by the same Gibbs/Carter combination. Speaking with Fred Carter, whose workmanship has made the two records possible, we learn that 165 m.p.h. is the target figure for something which is on its way from the now famous workshop. Details of the Carter approach will be found on pages 244-247 of this issue, where we describe his 5 c.c. engine. On April 30th/May 1st Ray Gibbs will be flying again at the 7th Criterium of Europe, Brussels, in company with a British private enterprise team of speed, team race and combat fliers.

### Who lost 'em?

A postcard from Epsom tells us that an A.P.S. "*Sporty*" landed in a certain garden on Saturday, March 10th, and if the unwise owner would care to identify his model by naming the engine, colour, etc., we will gladly tell him where to collect—and where to stick his "lost" notice.

More unique is the case of an air sea rescue in the Humber Estuary of a 6-ft. radio-controlled (was it?) model, found adrift on an ebbing tide and now awaiting identification at Sheffield. Model has a red fuselage and white wings: but owner must identify the engine, etc., when writing to us for the location address.

## Planes in the News

The flood of orders for the A.P.S. scale drawing of the Fairey Delta 2 to either 1/72nd or 1/48th scale leaves no doubt in our minds on the popularity of our accurate scale range. The F.D.2 was described in our issue for December, 1955, and as close comparison with latest photographs show, is "spot-on" to the last line. Congratulations to pilot Peter Twiss on his magnificent 1,132 m.p.h. achievement with prototype WG 774. The second F.D.2 is registered WG 777.

Also in the news, and as opposite in character as it is possible to get, is the diminutive Druine Turbulent which by coincidence was described in the same December issue. Air Registration Board Inspector, and committee member of the Popular Flying Association, Harold Best-Devereux borrowed Roger Druine's over-sized man-carrying model for a three week demonstration tour among the British lightplane clubs and P.F.A. groups. When we visited Elstree a few days after its arrival, Harold made a special demonstration flight for us, and was in return duly pleased to see Asst. Ed. Ron Moulton's scale model of the same type. F-PHFR is coloured Vespa metallic green and has black tips to wing, tail and rudder surfaces plus a six-pointed black star on the fin. As Turbulent number 201 it is the very latest type, following No. 200 which was the subject of the model in December issue, and registered F-PHFQ.

In a tree and hedge height flutter round the airfield, Mr. Best-Devereux ably displayed the capabilities of the Volkswagen-powered ultra-light, and we hope that many modellers have been inspired by similar flights throughout the country. The Turbulent can quite genuinely be built for approximately £350, of which £110 17s. 0d. is for the engine and £22 for the prop. Moreover, its similarity to the most elementary forms of model construction, with ⅞-in. sq. longerons and ⅞ x ⅛-in. rib structure place it well within the abilities of most experienced aeromodellers. Those who want to try their hand should join the P.F.A. at 19 Park Lane, W.1.

## New address for E.D.s

Messrs. Electronic Developments Ltd. have now moved into new premises at Island Farm Road, West Molesey, Surrey (*Tel.:* Molesey 6037) and all correspondence, engine repairs, etc., should be sent here instead of to the old Villiers Road, Kingston, factory.

## Glug! Glug! Glug!

Unusual mode of aeromodelling is given by contributor A. B. Custis in our American contempary "*Young Men*". He "flies" small plastic models *underwater*! Model is a Spitfire which, being close to same density as water, was perforated in various places to make sure no air remained inside, and then balanced "fluid-dynamically" by trial and error in the bath.

Original plastic prop. is driven by lightweight rubber gleaned from interior of golf ball, as normal ⅛th strip proved too powerful, and for prolonged underwater "glide" a motor one third longer than fuselage is recommended. Mr. Custis' comments on "flying" are best quoted ad lib.

"A face mask and a good breath will give you a ringside seat to the most realistic flights encountered this side of radio control. You see the prop turn and the entire flight is in slow motion. I use a weight to keep me at the bottom of the pool without effort, since a lot of thrashing around creates eddy currents which affect the flight pattern."

Leaving aside suggestions as to which member of the editorial staff should be suitably weighted and dumped at the bottom of the pool, we feel Mr. Custis has definitely got something. The behaviour of a body in water can be directly compared with its behaviour in air, apart from the speed factor, which in this case enables accurate observation of flight characteristics.

## Mistral Addenda

Peter Valentine's feature in the last issue which included his unique swept wing Slope Soaring design has aroused considerable enthusiasm and Peter passes on two more points of advice which will be of interest to builders.

Firstly, he advises that the model be trimmed over flat ground and during the test, the tail should sway side-to-side in flight. This motion will not occur when flown from a slope and is created by the large forward fin. It is best to start with a fin that is too big and trim it down until the swaying motion is gentle.

Second point is that the model should be trimmed for a *straight* glide and if these two rules are observed Mistral will *always* slip back into wind providing the wind is blowing up the slope.

*Ron Moulton sits his Turbulent model on the nose of visiting F-PHFR at Elstree. Note the small prop and neat hand beaten cowling on the full-size which covers the crankcase of the Volkswagen car engine. The Turbulent weighs only 340 lbs. (less pilot!) – ready to fly.*


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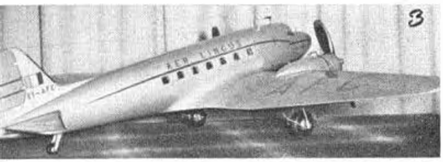
A THREE-IN-ONE FEATURE EMBRACING THIS MONTH'S ALL-SCALE MODEL NEWS, CAPT. C. MILANI'S MAGNIFICENT DORNIER PLUS . . .

# *There's*

THE ATTRACTION OF a twin or four engined model is universal, and many people must have wanted to build their personal dream ship, but have been deterred by the seeming difficulties of this branch of our hobby. Hence these few facts gathered by *practical* experience during the last few years. Note the stress on the word practical . . . no theories here.

Modern high performance engines, with their compact size and reasonable price, make the construction of a scale model of any full-size aircraft a practical proposition, providing that certain requirements are fulfilled. Now, what are these requirements? Well, first and foremost is propeller clearance at the fuselage and ground level. In some cases the engines can be mounted slightly farther out than scale, but use discretion and don't overdo this trick. Undercarriages can be lengthened in order to give ground clearance, but this is bad and ruins the appearance of the model in the air, besides which, long, leggy undercarts are very prone to damage on these fairly heavily loaded models. So keep the U/C to scale if possible, especially on models where the prototype has a retractable gear. Cowlings present the other main difficulty. Unless a model of gigantic size is envisaged, it may be found that the engines won't be hidden. However, if an inverted mounting is used it is surprising how unobtrusive the cylinder head will be, particularly on high wing types. One plea here, don't mount your engines upright if they are going to poke out the top of the cowlings. If you are nervous of starting two inverted engines, fit stunt tanks and then invert the *model* for starting . . . so easy!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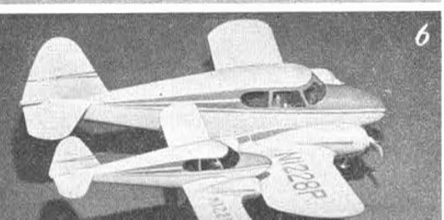

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*1. Ever popular APS Mosquito, this camouflaged one having a pair of Elfin 1.49 diesels which are almost completely hidden within the nacelles, built by R. Leach of Hull, who added dummy fuel tanks*

*2. Variation in colour scheme for the Mosquito, with invasion stripes. Built by R. Temporal & Son, of Wakefield it has an Oliver Tiger and E.D. Racer—a pair which should guarantee high single engine performance!*

*3. The Dakota is not altogether a suitable subject, due to close-set nacelles; but Thos Shortt of Ferney, N. Ireland built this 1/24th version for two E.D. Racers in '53—it is now the property of Aer Lingus, who took a fancy to it after seeing it on show at an exhibition*

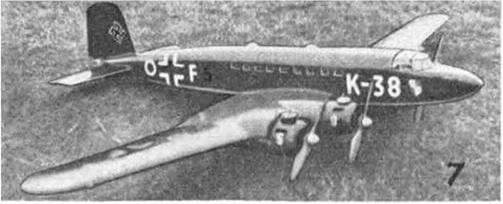
*4. Midnite blue against an Exeter snow background shows this N.A. Savage (D.C. 350, Allbon Javelin and Jetex 200) by J. Wright to an advantage. Span is 36 in. and weight 3 lbs. Note that the more powerful engine is on the inboard side—as advised*

*5. Four E.D. 3.46's power this huge Lockheed Constellation by R. M. Passey of Glevum in the West Country. Coloured in B.O.A.C. trim, it should be quite a sight in the air*

*6. Pair of Piper Apache twins are from David Shipton, Illinois, U.S.A. Smaller one is a solid, built for a local TV show, larger has two Cox Thermal-Hoppers for its 27½ in. span. Scale is ¾ in. to the foot*

*7. Most unusual selection is the Focke-Wulf Condor with 4 E.D. 3.46's by K. Humber and D. Jenkins of Sandown I.O.W. Six foot in span and weighing 5½ lbs., it took eight weeks of spare time to build and flies at 60 m.p.h. on 60 ft. lines*

*8. D.H. 104 Dove will fly on one engine in spite of only having a pair of point-fives and being 42¾ in. span. Light weight is the answer, this amounting to 25 ounces—a credit to builder R. J. Cook of Weybridge*

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# safety in numbers

by F. Buckland

Your choice of engine is governed by what you can afford—or borrow from helpful clubmates. If possible, choose 2.5's as these are invariably almost as powerful as some bigger engines, and often not much larger than 1.5's. Also they are generally easier to start with quite small diameter props of coarse pitch, a useful feature where prop clearance is critical. The advice about getting to know your engines before putting them in a model is doubly important and should need no stressing.

One tank per engine is the rule, preferably as big as possible and all the same size. No real advantage is gained from having odd-sized tanks, and certainly the complications of one large tank pressure feeding two or more engines is quite unjustified and can be a distinct disadvantage, by preventing those lovely single-engined, power-on landings which are possible when one engine cuts, especially with tricycle U/C models.

With the mention of engine cutting, we come to the popular belief of modellers that if the inboard engine cuts first on a twin, everyone will adopt a suitably mournful expression and rush as one man to inspect the pile of matchwood at the pilot's feet. The theorists will bring out slide rules and prove conclusively that this sad state of affairs is inevitable, thereby making twin-engined control liners very dangerous and short-lived objects, with a life expectancy in fact about on a par with the average combat job!

## Line stability

Nothing could be farther from the truth, so let us bury this bogey once and for all. Naturally, one mustn't tempt providence, but the point is twins *will* fly on the "*wrong*" engine quite happily if line stability is properly built into the model in the following ways:

**"A" Line rake.**—Very little is needed otherwise some crabbing will result. Just two orthree degrees is plenty.

**"B" Weighted starboard wingtip.**—Be liberal here. Two ounces or more can safely be used even on small models, and it is my belief that this is the most important deterrent to in-swinging twins.

**"C" Centre of Gravity position.** An elementary point, but how many control liners have you seen undulating round the circle because their C.G. is too far back? Never behind the front line is a good maxim here, and as most twins have fairly short noses, this is a point to be careful about when building. You can always weight a tail if a model flies nose heavy, but when it staggers round tail heavy and barely under control there is not usually a second chance. So keep that balance point well forward, it's an invaluable aid to line tension and we're not after a stunt performance.

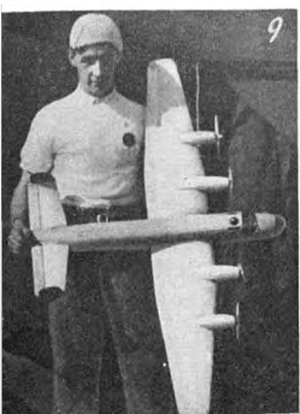
**"D" Offset flying surfaces.** Rudder and/or aileron offset can be used, but only on light aircraft which may be a bit underpowered. On a heavy fast model, offset can be embarrassing by causing severe strain on lines and pilot.

When flying slowly on one engine, *i.e.*, when line tightness is essential, offset surfaces are not very efficient, whereas at high speed when centrifugal force is powerful the pull is increased unnecessarily. Wing tip

*9. Not exactly the brightest of the APS plans is that for the 50 in. rubber driven Halifax. M. M. Booth of [illegible] has made this neat conversion to 4 E.D. Bee's, presumably with sheet covering over all surfaces*

*10. 64 in. Hampden weighs 6½ lbs., of which 12 oz. is nose ballast. Has an E.D. 3.46 and D.C. 350 and flies on 70 ft. lines with no more pull than a team racer states builder Stan Perry of Cheltenham.*

*11. Current favourite for "fours" is the Lancaster, following the Dam Busters film. This one was made by E. McGregor of Glastonbury. Span 76 in., weight 5 lbs. 2 ozs., power E.D. 3.46 and Amco 3.5 only*



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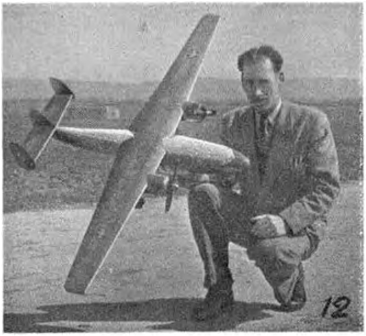



*12. A. Dowdswell's Ambassador has a pair of E.D. Racers and is well-known in the Gloucester district. Model is mentioned in Classified Advertisements this month*

weights, on the other hand, are most effective at slow speeds; but when the model is flying fast the increased lift generated by the outboard wing cancels out the weight. All this reads suspiciously like theory with a capital "T", but it has proved its worth on numerous multis—and the author has never lost one yet through inswing. Incidentally, a *straight* fin and rudder is already offset to the flight path of a control liner . . . and it looks better, too.

## Wing sections

A word here on wing sections. Most designers seem of the opinion that a symmetrical or bi-convex section


*14. Small replica of the Convair in Lufthansa colours is from Germany and uses two E.D. Baby's with three blade props cut from toy helicopter "Flying Saucers"*

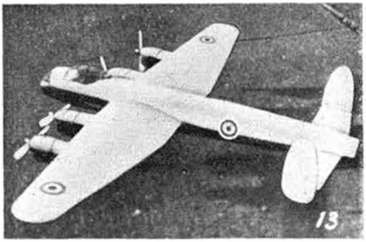
*At right. Model of the Month is the star of the 1956 Australian Nationals, a perfect Vickers Viscount by Max Newnham (note flaps are down). Has four Sabre 29's, is started up electrically, and takes two to hang on the handle. It's the result of 2,000 hours diligent and painstaking work!*

is essential if the model is not to dance like a dervish at every puff of wind. I have never been able to follow this reasoning; after all, if a wing lifts, its lift will increase as airspeed increases, no matter what its section. Does a Clark Y flat-bottomed section cause difficulty in wind? It has never been found so on scale multis with their usually fairly heavy loading, and it's so much easier to build an accurate wing using Clark Y. Of course, if you want inverted flight then a symmetrical section is essential ! ! !

## Flying

Finally to flying. Use steel lines with double loops and ensure all connections are tight and controls are free. Elementary precautions, perhaps, but more than one expert has come to grief through lines coming adrift as those who witnessed the heart-stopping crash of Mr. Briggs' "LINCOLN" at Radlett will testify.

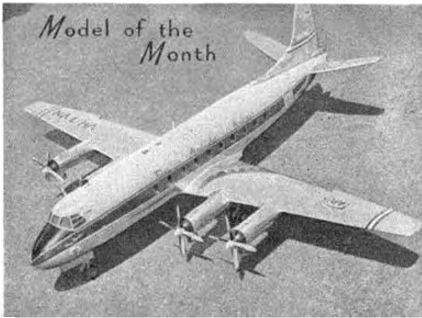
Too many cooks, etc., is very true when applied to control line twins, a mess of hands all over the model, flicking, filling tanks, adjusting engines, is nothing but confusing to the poor owner. Just one helper is plenty. Fill tanks (a squeeze bottle is a boon), warm up inboard engine for a few seconds, then stop it. Start up outboard then restart inner. Do not try to fill tanks with engines running, it's so easy to flood and stop them. When both are running sweetly, off to the handle, a quick check and away you go to a new flying thrill. When you do lose one engine, keep model well down to head height till the last engine cuts. If you have a tricycle undercart, however

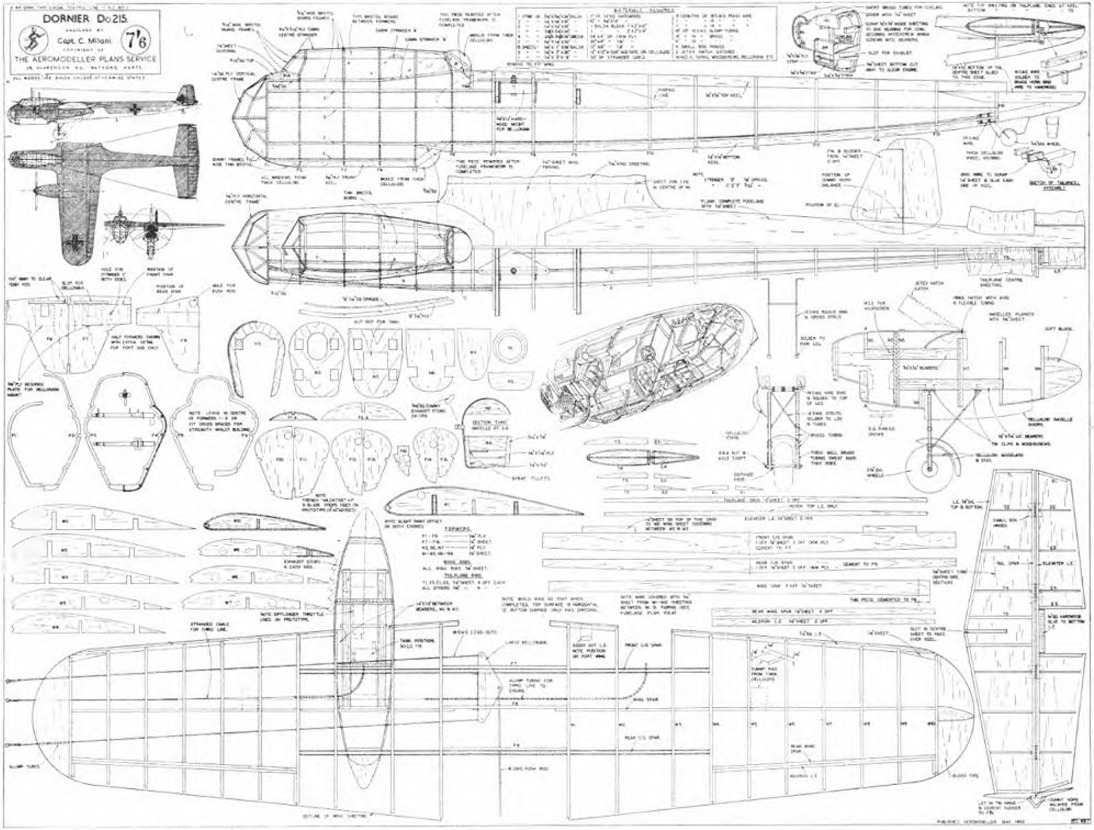



*13. Another Lancaster, this one in Coastal Command colours, by A. Howes of Ramsgate. Span is 68 in., weight 5½ lbs. and it has flown several times on only one of its four E.D. 2.46 Racer diesels*

it is possible to land under power with one engine, which is a most satisfying manoeuvre when carried out smoothly. A slightly turned out nose wheel is an aid to ground stability on landing and take-off with this type of U/C.

The piano top expert and the theorist may not agree with all this advice, but this article in any case is not for them. It has been proved that two, three or four engines are no more difficult than one, and that there really is . . . safety in numbers.






DESCRIPTION OVERLEAF

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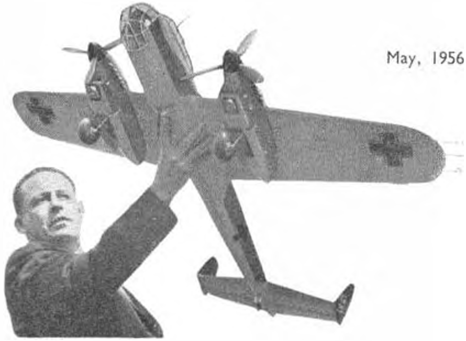
**A magnificent model justified by the finest drawing in the Aeromodeller Plans range, and a perfect mate for the already famous APS D. H. Mosquito**



# Capt. C. Milani's DORNIER 215

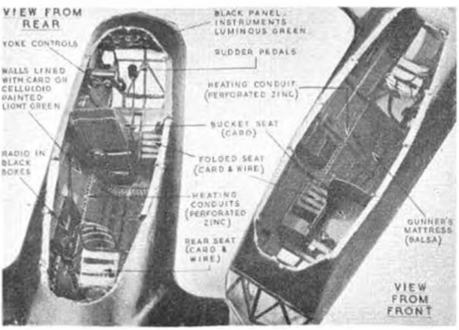
OF THE MANY control-line scale models it has been our pleasure to examine, none can compare with Capt. Milani's detailed Dornier either on the basis of internal and external adherence to scale perfection, or in flight performance, and it is only after some weeks of concentrated draughtsmanship that we are able to introduce the design for all to enjoy through the medium of AEROMODELLER Plans Service.

Forgetting the superlatives—one could sum up the Dornier as being king of its class. It flies under full throttle control, with Eifflaender carburettors on its pair of E.D. 3.46 Hunter diesels, taxies slowly, roars into full power for take-off, reduces revs for cruising, and lands on a tickover or after *either* engine has cut. Note that point, for the slight engine offset allows it to fly even in a strong cross-wind when the inner motor happens to run dry first. It is in fact, a "safety first" design, for Cesare Milani is not only to be admired for the many touches of ingenuity in this model, but also for the built-in practical points (like the ply keel under the nose for a bouncy landing, or three-sheet tailplane with hidden box hinges). Internally, the original is complete even to the mattress on the floor for the rear gunner, and use of perforated zinc, cardboard and soft wire produces a set of furnishings that would honour any static museum exhibit, as the photos show.

One does not have to be a Milani perfectionist to reproduce the Do. 215, but it does call for modelling experience, in view of the fuselage planking and "glasshouse" nose structure. Anyone who has built the A.P.S. Invader, Mosquito, Catalina or Hannibal multis will find construction easy, if perhaps a trifle demanding in the nose formers. For simplicity, and particularly if interior detail is not required, the nose is less formidable with solid balsa bulkheads to replace ply frames F1—F6. Similarly, one does not *have* to use full throttle control, nor a pair of 3.5 c.c. diesels, for experience has shown that the model will fly well on the power of one engine alone to indicate that any combination totalling 4 cc.. upwards would do the trick (powerful engine in the port nacelle).

A glance at the list of materials required will show that the model is mostly ply, and 1/16-in. or 1/8-in. sheet balsa, so construction should start with plenty of fretsaw practice on the ply formers. Assembly follows the standard procedure of vertical crutch construction, with half formers mounted on the keels, which are then lifted from the plan, other halves fitted and spruce stringers added. Wing can be made in one piece with one side finished first, then spars are "rocked" to bring other side flat on the board. Bare wing framework is then fitted to the formers F7, 8 and 9, and build up nacelles around N7, 8 and 9 on spars. Tailplane can be made in either of two ways. It can be completed ready to fit the fuselage or made top half only and bottom ribs and sheet added when fuselage planking is complete, then fit the control mechanism. The entire model is sheeted and planked, noting scale aileron grooves, and nose frames fitted ready for glazing. Interior furnishing, like many other building hints are detailed on the plan, and final finish will entirely depend upon the whim of the constructor.

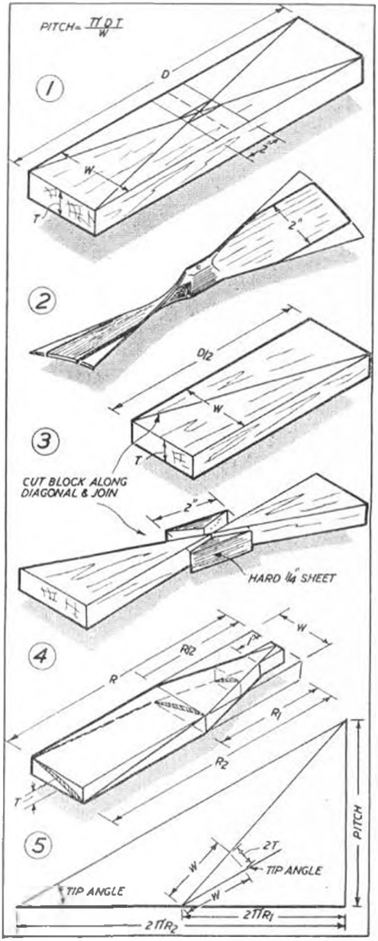
The original bore an authoritative glossy bottle-green upper surface, and glossy sky-blue undersides with all rivet lines neatly marked by a rotating clock wheel. A covering of lightweight tissue and several coats of sanding sealer form the basis of a fine surface and with a total weight of up to 50 ounces, the Dornier is as lively as a cricket on 60-ft. lines giving one the impression that a loop would not be as hazardous as might be imagined!




*Left: Interior detail is authentic and quite simple to reproduce in card, perforated zinc and soft wire*

# Aeromodelling Step-by-step

## SIMPLE "X" TYPE BALSA PROPELLERS




INDOOR MODEL propellers and large diameter propellers for Wakefields are commonly of the "X" type, so called because the propeller blank is marked out in diagonal lines and not tapered in thickness—**1**.

In the case of large diameter propellers for outdoor (rubber) models, block width (W) is usually at least three times the block thickness (T) in order to get the required pitch. The blade shape resulting from the carved blank gives far too much area towards the tips and so blade width is trimmed down, after carving. Parallel chord blades are common with this type of propeller, with the actual blade width two inches—**2**.

Quite obviously, carving a propeller in this fashion results in a lot of waste wood and so it is common practice to build up the blank from a block equal in length to one half of the required diameter—**3**. The two pieces are then joined with hard ¼ in. sheet.

Regarding actual dimensions, the larger the propeller the smaller the pitch. A rough and ready rule which gives good results in practice is that diameter plus pitch should equal 48. Thus a 22 in. propeller would have a pitch of 26; in. a 24 in. diameter propeller a pitch of 24 in.; and a 26 in. propeller a pitch of 22 in. These three diameter sizes also represent the usual range of large diameter propellers used on Wakefield size or similar rubber models consistent with a 14-16 strand motor (¼ x 1/24th) dimensions are summarised in the tables.

Since large diameter propellers are invariably made folding or feathering to reduce resistance on the glide, the two blades can be carved separately, although in the case of a folding propeller it is best practice to carve as a complete propeller, fit the hinge and then cut free the blades. Single blades, can be carved from sheet stock.

A typical blank takes the form shown in **4**. The sheet blank is cut to plan outline and then carved edge-to-edge over the inner (tapering) part and to edge *diagonals* marked on the two edges of the parallel section. This gives a near approximation to a blade with true geometric pitch when the blade is set at normal pitch angles. The blade root is finished off square or cylindrical, as required (e.g. the latter to plug into a tubular hub).

The sheet thickness required can be worked out by drawing the "propeller diagram"—**5**—to any convenient scale. Pitch is marked off on the vertical line and the circumferential distance of the start of the parallel blank ($R_1$), and that of the tip along the base line. Jointing these two points to the pitch gives the required blade angle at these two points. Draw on the tip angle against the steeper angle at $R_1$ and mark off the blade width on each of these lines. The measured distance between them will be equal to twice the sheet thickness required (to the scale of the drawing). For convenience of working out it is usual to make $R_1$ equal to one half $R_2$ (i.e. $R_1$ = ½ diameter) when the base lengths in **5** become "pi" × R and "pi" × D, respectively

"X" Blocks from "Standard" block widths

| Propeller dia. x pitch | Block Width | T | Block Width | T | Block Width | T |
|---|---|---|---|---|---|---|
| 22 x 26<br>24 x 24<br>26 x 22 | 3½" | 1.4"<br>1.1"<br>.95" | 4" | 1.5"<br>1.27"<br>1.08" | 4½" | 1.7"<br>1.41"<br>1.2" |

"X" Blocks from "Standard" thicknesses

| Propeller dia x pitch | Block Thickness | W | Block Thickness | W | Block Thickness | W | Block Thickness | W |
|---|---|---|---|---|---|---|---|---|
| 22 x 26<br>24 x 24<br>26 x 22 | 1" | 2.66"<br>3.14"<br>3.7" | 1¼" | 3.3"<br>3.9"<br>4.6" | 1½" | 4.0"<br>4.7"<br>— | 1¾" | 4.6<br>5.5<br>— |


# Stressing—without strain

An easy-to-read, easy-to-understand article showing how to improve your models.

By Harry Tagg

## Do your wings break in the middle?

It appears that it is an essential part of any modeller's apprenticeship to break the wings of several models in flight. This mainly happens in towing gliders, but power models and rubber jobs also suffer. The "expert" (you've met em!) then tells him he towed too fast or his wings weren't strong enough.

These pronouncements are not only small consolation, they are also only partly true and certainly do not help the victim. The latter might perhaps go home and make a new wing, heavier, with 3/16 in. square spars instead of 1/8 in. square. But what happens next Sunday? He breaks it.

I will guarantee that nine times out of 10 the wing will break in the middle. Even if our learner goes on increasing the spar size, the centre section will still be the part that cops it if anything does. This must be because the stress is a lot greater there than anywhere else on the wing. Of course, you cannot make an unbreakable wing. You have to decide what degree of strength you require or can afford. For example, in building a R/C "knock-about", very considerable strength is built in, while in a Wakefield you can only "afford" relatively little strength. But what we must avoid is *weak spots*. If we increase total strength we still retain our weak spots, resulting in a structure that is unnecessarily heavy.

Obviously, the thing to do in a wing is to beef up the centre section only. Our apprentice when he appreciates this point may now find another weak spot where his extra centre-section spars terminate. This sort of trouble can go on indefinitely unless we sit down and think about it.

It must be theoretically possible to make each part of the wing equally able to stand the forces acting on it. Then breaks occur not at definite spots but merely by chance. The astonishing fact is that if you eliminate the weak link, the whole thing becomes immensely stronger for no increase in weight.

## Stressing is the answer

A hit-and-miss method gets us nowhere—it just reveals more and more parts to break. There is a way of working out the strength required so that a wing is equally strong for the load it carries throughout its span. In full-size aircraft design, this is called stressing. The strength requirements of each part are determined theoretically and the part is made accordingly. Let's do a little stressing for a model glider wing. This will be much simplified and we will do it with arithmetic instead of calculus.

Our glider weighs 18 ounces and we will examine how this weight is supported by the wing structure. Actually the wing never takes just 18 ounces weight. In towing it takes many times this, in gliding down it takes less. However, this is a convenient figure to work with and we are interested in the *distribution* of the load (which we can assume remains the same), not in the actual value of it.

A simple rectangular half-wing, 30 in. span taking nine ounces weight is shown in *Fig*. 1. We divide this into three panels, A, B, C. Now brushing aside the "experts" who will talk to you about elliptical lift distribution, we assume that each panel lifts three ounces and that this lift can be considered to be concentrated in the centre of the panel (we could satisfy the experts without making any difference to this little talk, but it would just complicate the arithmetic).

Using these figures we can now examine the stresses imposed at the three points X, Y and Z.

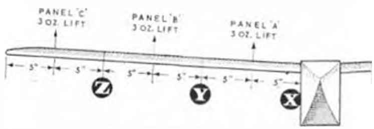



FIG. 1

| Stresses at Station | X | Y | Z |
|---|---|---|---|
| Due to A | 15 | — | — |
| Due to B | 45 | 15 | — |
| Due to C | 75 | 45 | 15 |
| Total at each station | 135 | 60 | 15 |
| Ratios | 9 | 4 | 1 |
| Example I Square Spar | [illegible] in. sq. | [illegible] in. sq. | [illegible] in. sq. |
| Example II [illegible] in. sheet spar | [illegible] in. wide | [illegible] in. wide | [illegible] in. wide |

## Simple Arithmetic

Consider first of all panel A on its own. The lift on this will help to hold up the fuselage through the point X. The strain at this point will be measured by the lift (three ounces) and the leverage (5 in.) that it exerts. This is called 15 inch-ounces. There will be no leverage at Y and Z due to panel A. (We are ignoring for simplification the small actual weight of panels B and C.)

Now consider panel B on its own. At X this exerts a strain of 3 x 15 = 45 inch-ounces. It also exerts a strain at Y of 3 x 5 = 15 inch-ounces.

Finally panel C on its own will exert 3 x 25 = 75 inch-ounces at X, together with 3 x 15 = 45 inch-ounces at Y and 3 x 5 = 15 inch-ounces at Z.

Now combine all these together and we have the distribution of strain at the three points X, Y and Z to be 135, 60 and 15 inch-ounces respectively.

## What do these figures mean?

They mean that at X the spar must be nine times as strong as at Z and Y must be four times stronger than Z. That's quite a shaker isn't it?

Have a look at the examples of tapered spars that would be required to satisfy this distribution of strength. No wonder wings break at the centre section—nobody would accidently hit upon increasing the strength in this proportion. Highly tapered spars are essential even in a constant chord wing. The alternative is unnecessary weight (if the centre is to be strong enough for your purpose) or inadequate strength.

I said that by eliminating the weak link, the whole thing becomes immensely stronger for no increase in weight. Compare the spar ⅜ in. square tapering to a point at the tip. This is equivalent in weight to a non-tapered spare of 3/16 in. square. At the centre section the latter is only ¼ of the strength of the tapered one! At the middle it is exactly right and near the tip it is four times heavier than required. If you don't believe this, cut a couple of spars, clamp them to the bench and test them.

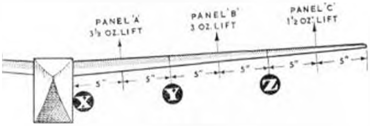



FIG. 2

| Stresses at Station | X | Y | Z |
|---|---|---|---|
| Due to A | 17½ | — | — |
| Due to B | 45 | 15 | — |
| Due to C | 37½ | 22½ | 7½ |
| Total at each station | 100 | 37½ | 7½ |
| Ratios | 10 | 5 | 1 |

## There are other stresses

Of course there is a lot more that happens to a wing besides a plain bending load. One with which we have trouble is twisting (*see* various articles about "geodetic" construction). Also a model does not have to contend just with flying loads. There is "landing" (I mean the sudden termination of its flight by soft grass—we hope), and also "handling" (I mean the helpful farm boy with big fingers). The worst thing that can happen is for the whole momentum of the model to be absorbed by one extremity—a wing-tip-as it cartwheels. This does not mean that after all we will need spars to be thick at the tips, because the weight of the model is still acting over the wing as a lever. What we should do is decide what strength the wing extremity needs to be, taking into account previous experience, "landing" and "handling" loads.

Remember that theoretical considerations are all very well, but we do not wish to have such small spars in places that local failures can occur too readily. Thus our "theoretical" spar which tapers to O at the tips would need an extra bit all the way along so that it ends up at ⅛ in. x 1/16 in. square instead of a point. The second example of a spar taper is a practical one.

## Application to tapered wings

If we consider a tapered wing, giving a reasonable estimate of lift distribution, the taper of our spars becomes even greater. *Fig.* 2 shows a wing of similar dimensions tapered so that the areas of panels A, B and C are in proportion 4, 3, 2 (the lift however, is not quite in this proportion because of the losses at the tip and centre sections, so we have given it as 3½, 3, 1½). You will see that the proportion of strength as between X, Y and Z is 10, 5, 1.

In tapered wings it is much easier to include tapered spars, but this does not mean that tapered wings are better in themselves. On a tapered Wakefield wing, a suitable set of spars approximating the 10, 5, 1 proportions would be as follows: A leading edge which tapers from ¼ in. x 3/16 in. to 1/16 in. x ⅛ in. Trailing edge ⅜ in. x 1/16 in. to ¼ in. x 1/16 in. Spar or spars, the equivalent of 3/16 in. square tapering to 1/16 in. x ⅛ in. I must remind you that while this wing would be very strong for its weight (between ¾ and ½ ounce per half-wing) you would not be able to support the model by its wing tips! The technique is of course, to arrange some knock-off fitting for "landing" loads that gives just before the tip does. Also, if spars are not tapered in depth and thickness, the taper must be curved.

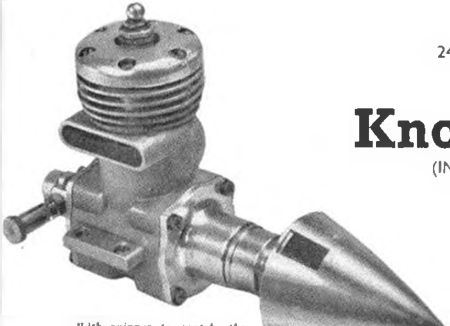
An example of a highly tapered spar is in the APS "Lavengro" glider. Using an "old-fashioned" thick section, an immensely strong spar is possible. It is made in a simple manner of laminated ⅛ in. sheet. Each lamination is ¼ in. tapered to 1/16 in. When they have been cemented together, the required depth taper is cut from the top side.

The best method of using material in tapered spars on tapered or constant chord wings, is to cut a curved taper from sheet.

## The latest fashion

Now suppose we would like to produce a stressed-skin sparless wing entirely of sheet. The strength of such a wing is solely in its covering. Also suppose that we would (quite naturally) use the same thickness of sheet throughout. Now how are we going to ensure our distribution of strength in the proportions outlined above? Well, treat the whole of the covering as a spar of constant thickness. To satisfy the taper rules we therefore need the width of this "spar" to vary in a curve. In that case we have to make the whole wing outline a curve, and what have we got—a crescent wing!

I will leave you to think about that one on your own.



*With spinner to match, the Carter is an eye-catcher worthy of the most skilled engineers*

# Know Your Engine-

(INCORPORATING ENGINE ANALYSIS No. 21)

**The famous Carter 5c.c. racing**
**World Speed Record (F. A. I.**
**by Ron Warring—and details**

HAVING DISCUSSED the basic principles of port timing and motor design in general during the past two articles in this series, we are pleased to be able to unfold the answer to many a reader's query in this month's feature, which by rights, should be entitled "How Fred Carter does "it". The "it" being the tremendous individual achievement in producing tuned engines for the fastest Class B Team Racers and Class 1 and 2 F.A.I. speed models in the world today.

Strictly speaking this should be a report on the "man" rather than his motor. To be completely accurate, two men are involved, first R. "Gadget" Gibbs, the man responsible for building and flying the speed control line models which have recently "upped" British speeds by some 15-20 m.p.h.—to 146.2 m.p.h. in Class 4 (5 c.c.) and 123.5 m.p.h. in Class 2 (2.5 c.c.). A further record attempt made on December 18th last using thinner lines with the Class 2 model boosted the 2.5 c.c. figure to 208 km. per hr. and is now ratified as the new Class 1 F.A.I. World Record. Since the subject is "motors" we will omit any further description of Gibbs and his models, except to add that his practised flying technique has contributed in no small way to the attainment of world's best order.

The second man behind the motor is Fred Carter, a watch repairer by trade and himself at one time a pretty good control line flyer. His present speciality, and indeed currently his sole practical interest in the movement, is in making motors which will go faster than anyone else's. Starting point may be a "recognised" racing motor, like a stock McCoy, Dooling or Eta, but the end product may well include only the crankcase casting of the original unit.

When we visited Fred in his Leytonstone home recently, we found him at work on a brand new McCoy 29 which was being prepared for team racing. The McCoy is favoured for this duty, as it has the stroke to deal with the large pitch and blade area (compared with speed toothpicks) needed, and it offers the best speed/range ratio of up to 112 m.p.h. over 24 laps. Its crankcase will not shatter (as happens to another motor tried for the purpose) and it lends itself to the Carter treatment without complaint.

## McCoy made

What happens to this new motor is roughly as follows: The alloy induction disc and steel spring shim, the rear ball race, and the head gasket are consigned to the waste bin. A Tufnol disc is made, with the same timing (provides better running fit and obviates worn alloy disc scrapings from going through the engine to spoil other bearings) and a new cylinder head turned to give a leak-free metal-to-metal fit on the cylinder.

The short-life rear ball race is exchanged for a Hoffman and the front race (for which there is no British equivalent) is given a thorough overhaul to see that it is doing its job properly. On the cylinder porting only the bridges between port-holes are touched, to give less restriction to gas flow. The rest of the treatment is no more than good honest workmanship of the very highest standard. In fact the workmanship is such that in terms of running hours, all of Fred Carter's products are comparatively youthful. They are not tested by him before leaving his charge—and such is the confidence that the West Essex and East London fliers have in his work that they fit the motors directly into their models and only use them when required for competition.

Speed performance—and that includes team racing—is ultimately dependent on how much power you can get out of a particular motor. Right from the start, tuning and "hotting up" standard motors has been established practice, the only trouble being that tuning up a motor is a rather intangible subject. As soon as one authority lays down a set of general rules, another comes along with equally good results by ignoring these rules and doing something else. A lot of the so-called "reworking" of an engine does no good at all, and may even produce the potential performance of a stock motor.

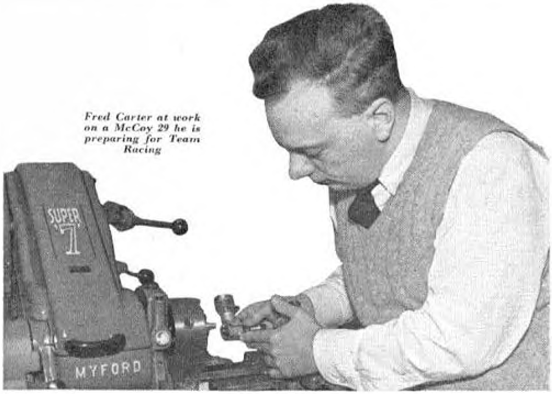
On the other hand Fred Carter himself makes the rather sweeping statement that none of the recognised stock racing engines are anywhere near as good as they could be. Presumably this could be rewritten as a statement that no mass-produced engine can be built with the precision necessary to get the maximum B.H.P. per c.c. out of it. Further, world class performances in speed have now quite surpassed speeds which can be achieved with stock engines and that a "special" is essential to compete on equal grounds with the state and manufacturer-sponsored teams of other countries.

Put it down in facts and figures and you begin more and more to respect Fred Carter's views. A standard Dooling 29 which is just about the best of the stock racing motors of its size, can achieve about 125 m.p.h. The Carter Special, rebuilt around the Dooling 29 has recently turned in official speeds in excess of 146 m.p.h. That 20 m.p.h. gain is the product of extensive reworking—virtually, indeed, a complete redesign of engine along the same basic lines.

All this really dates back to about 1950 when Fred Carter was flying control line stunt, was being tempted by speed and had the feeling in the back of his mind that having found out a little about commercial engines and their limitations that he could do a bit better. Perhaps the contrast between a precision watch mechanism and the precision standards adopted for engine manufacture was too much! At any rate, his first serious attempt to rework an engine was on a Nordec 10 c.c. (virtually a copy of the

# Speed Tuning

**engine—holder of the series 11) is tested given on its tuning**




*Fred Carter at work on a McCoy 29 he is preparing for Team Racing*

American McCoy 60), which he accomplished with no mean success. At a time when the other speed flyers were still finding the "ton" elusive, Fred's reworked Nordec carried his "Little Rocket" well past the 100 m.p.h. mark and was fairly consistent at about 116 m.p.h. Modifications in this case consisted mainly of a new piston and new head.

From Nordec to McCoys to Etas and Doolings, Fred Carter's fame was soon established, locally, at least. But speed flying itself was in the doldrums and not until the first Nationals at Cambridge did people begin to sit up and realise that there was something very special about a Carter reworked engine. Davenport turned in a speed of over 160 m.p.h. with a Carter-Dooling which was more "Carter" than "Dooling" and set many a person arguing that the timekeepers had missed counting a lap. But that performance was real enough, as Gibb's recent speeds with both 5 c.c. and 2.5 c.c. engines have shown. They are performances which can be duplicated under similar conditions. The real point is that the jump in performance is so startling that it confounds people's previous ideas of control line speed standards. It also makes some of those apparently fantastic American speed claims quite logical, especially as the Gibbs-Carter combination can better them!

As far as the suitability of the engine is concerned, there is only one *type* of motor which Fred Carter considers worthwhile for speed. That is the cross-scavanged glow motor with rotary disc induction and ball bearing crankshaft—as exemplified by the McCoy Dooling, and the British Eta. Fred will just not consider diesels in any form, plain piston engines, plain bearing engines or those with circumferential porting. He is interested only in getting maximum peak performance, and that is his starting formula.

Reworking is essentially an application of a "basic" modification plus any little extras which he thinks worth trying out—a sort of calculated guess as to whether or not a small alteration here and there will improve performance or not. And that is something which cannot be put down in words! The reworked engine invariably ends up with the same crankcase, but that may be the only original part. In other cases the original crankshaft and bearings may be used, but inevitably there is a new cylinder liner, piston, rotor and back cover assembly.

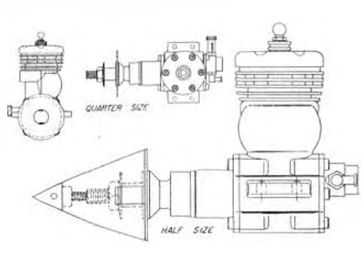
The obvious question at this point is, why not start right from scratch and make the crankcase too? The answer here is that the crankcase casting is usually quite intricate on a motor of this type and to have this unit as a starting point saves a lot of time and trouble. That is the only reason; and we should not be too surprised if one day Fred does start from "basic stock".

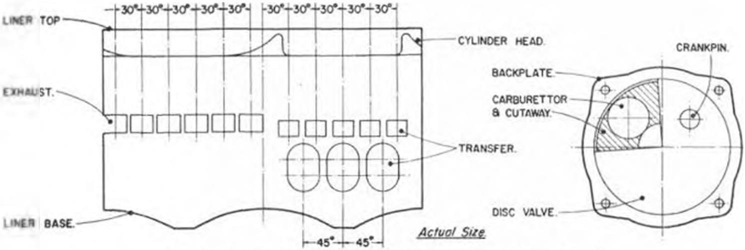
## The Carter "5"

The particular motor we had for test was the 5 c.c. reworked Dooling which retained the standard Dooling crankcase, crankshaft connecting rod and front ball race (this only being because of a size difficult to duplicate over here. Everything else was new, although externally the only noticeable difference with the finished engine is in the head with centrally-located plug, plus the extremely high finish on all the new parts. Internally however, it is quite a different story. Incidentally the motor has an interesting case history in that it was first imported by our own Assistant Editor who passed it on to Don Powell in 1952. He used it for speed, won the 5 c.c. class at the '53 Nats at 124 m.p.h. and eventually had the satisfaction of pushing the British 5 c.c. record to 133 m.p.h. at the 1954 Nationals. Thereafter it changed hands for Ray Gibb's ownership and so it could be truthfully said to be king of its class over the past two years.

The original shrunk-in liner was removed and replaced with one made from Meehanite bar stock carried down to the full depth of the casting. Ports were filed by hand, duplicating the layout of the original but with a slightly later exhaust opening and slightly later transfer. (Shallower ports providing *less* area than on the original Dooling.)

The piston is a new casting in standard piston alloy, cut with ports in the wall in Dooling fashion but with a curved skirt the full depth of the liner each side. Some 120 degrees of the piston on the exhaust side is generously relieved and a single ring is used just below the crown. The deflector is straight but sharply peaked, the head machined away to a matching shape. Compression ratio, by rough estimate, is about 8 : 1.



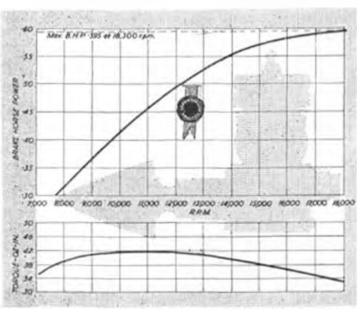



*Full-size drawing of the vital cylinder and backplate will be an aid to other engine "tuners". Porting is actually smaller in area than in the Dooling 29*

The top of the piston and the inside of the head are highly polished, this being the only internal polishing done. Here, in fact, is one of those contradictions in engine tuning. Nearly everyone who has written anything about the subject emphasises the importance of polishing and careful shaping of the ports to minimise gas friction with fillett radii on "square" corners etc., Carter does not consider this necessary, or worthwhile. About the only concession in this direction is filing down the vertical columns across the exhaust port to minimum size (about 3/64 in. wide). As to the importance of plug location, Carter holds here that if it gives the expected performance with the plug in the middle, then leave it there. If performance does not come up to scratch, a new head and piston would be an obvious "second try". We get the impression, however, that second tries are a bit of a rarity.

### "One-way" fits

Undoubtedly particular care is taken over the piston-liner fit to get optimum compression seal and piston support with minimum friction. It makes a noticeable difference on the 5 c.c. engine for instance (and the same would apply to similar types reworked in the same way) if the cylinder unit is rotated through 180 degrees to bring the exhaust to the left hand side, i.e. transposing the side thrust to the other side of the piston. Another interesting fact was that the compression seal was slightly better going down than up, i.e. a better seal on the firing stroke.




A common source of trouble on stock rotary disc engines is the mounting of the rotor disc itself. Invariably this unit is re-made by Carter, with a Tufnol disc and backplate unit with integral choke tube machined from solid. On the 5 c.c. special the disc itself was mounted perfectly on a generous size spindle and long bearing. There was absolutely no signs of play and, in fact, the static fit appears quite tight, although this is due to oil drag and will practically disappear at high speeds. Intake timing appears to be reduced at both ends, compared with a standard Dooling, this being 180 induction period.

The front end of the engine is quite conventional, beautifully made and with perfect shaft support. The only modification to the crankshaft is a reduction in diameter of the end of the chrome plated pin which engages in the rotor disc. The front bearing remains the standard ball race by Doolings but the rear ball race is of British origin. The unit, like the backplate, is assembled without gaskets. It is perhaps an indication of the accuracy of fitting that although the standard Dooling crankcase unit is reamed right through, the back cover was too tight to fit the "front" end.

Our operating experiences with a standard Dooling "29" is strictly limited to this same engine when new but our impression was that the Carter Special started easier and was generally easier to handle. Hand starting can be employed quite safely up to the smallest sizes of propellers. We did, in fact, hand start on a 6 x 4 Frog

PROPELLER R.P.M. FIGURES

| Propeller | r.p.m. |
|---|---|
| dia. pitch | |
| 11 x 8 (Whirlwind) | 6,300 |
| 9 x 4 (Stant) | 13,600 |
| 9 x 8 (Stant) | 10,600 |
| 9 x 10 (Stant TR) | 10,500 |
| 8 x 4 (Stant) | 17,800 |
| 8 x 8 (Stant) | 13,800 |
| 8 x 9 (Stant) | 12,500 |
| 7 x 10 (Reworked Stant) | 15,000 |

Fuel: Mercury No. 7 plus added 25 per cent. Nitromethane

**SPECIFICATION**

Bore: .792 in.
Stroke: .594 in.
Displacement: 4.8 c.c. (.293 cu. in.).
Bore/Stroke ratio:
Weight: 7 ounces.
Max. B.H.P.: .595 at 18,000 r.p.m.
Max. torque: 42 ounce-inches at 11,000 r.p.m.
Power rating: .125 B.H.P. per c.c.
Power/weight ratio: .086 B.H.P. per ounce.
Availability: Special racing engine by F. Carter
Not available commercially

nylon propeller without trouble but were so horrified by the noise as the engine screamed up and up way past 20,000 r.p.m. that we stopped it before taking any tac. readings.

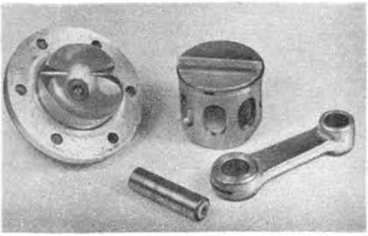
Low speed performance, we would say, was moderate, which is only to be expected with a racing engine. At this stage needle valve setting was completely non-critical, but the more and more speeds went up the more necessary it became to adjust the mixture carefully for best performance. At 18,000 r.p.m. plus mixture setting was quite critical.

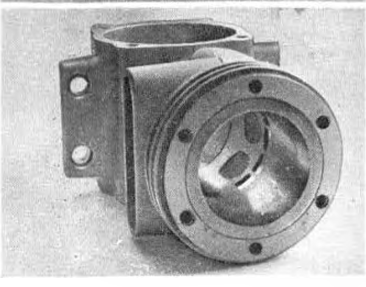
Recommended fuel as used by Gibbs was equal parts of nitromethane and methanol, plus about 20 per cent. Castrol "R". The mixture used on the test runs was obtained by adding 25 per cent. nitromethane to standard Mercury No. 7 to arrive at a similar nitro content. No increase in performance was apparent with more nitromethane.

The torque is well sustained and the engine, as tested, peaked at just over 18,000 r.p.m. at an equivalent B.H.P. of almost exactly 0.6. The actual power figure is a little lower than that which could be achieved in the air, although the peak r.p.m. point appears about right for the official speeds obtained on given propeller sizes. Propellers used by Gibbs were Stant 7 x 10 and Truflo 7 x 11 with re-worked blades, giving something like 15,000 and 14,000 r.p.m. respectively, on the ground. Gibbs and Carter estimated that actual flight r.p.m. of the motor at record speed was 18,000-18,500.

Summarising we can only say that the Carter Special is one of the most beautifully made motors it has ever been our pleasure to examine. For the rest, its performance on the flying field speaks for itself.

*Some idea of the high standard of workmanship can be gained from the photos of internal components below. Note single ring, straight baffle on piston, and corresponding transfer ports on piston and cylinder*





# RAF GEN


How much do you know about the Royal Air Force?

***RANK, TITLES & CAP BADGES***

***by Bruce Fergusson***

THE BASIC FEATURE of the Badges of the Royal Air Force is the EAGLE. This has caused quite a controversy within the Service and opinion is still divided. Some schools of thought continue to hold that the bird is an Albatross in spite of evidence to the contrary!

The controversy started as a result of the Board of Admiralty re-naming the Naval Wing of the Royal Flying Corps the Royal Naval Air Service. Regulations were issued on June 23rd, 1914, which stated that officers of the R.N.A.S. would wear an EAGLE on the left sleeve above their rank lace. An EAGLE was also substituted for the anchor on the buttons, cap badge, and other insignia.

According to tradition the Admiralty adopted the eagle design from a brooch, depicting an eagle, with outstretched wings and its head inclined to the right, which a Naval officer had bought in Paris as a present for his wife. Thus from the outset the bird was an EAGLE.

In spite of this, however, Naval pilots felt that the eagle, being a land bird, had no place in Naval tradition, so they started the rumour that the bird was an albatross, or sea-going bird.

When the R.A.F. was formed in 1918 from the merger of the R.N.A.S. and the R.F.C., the new Service took over the R.N.A.S. style of rank insignia *and* the bird. Quite naturally the ex-Naval members of the R.A.F. stuck to the old fallacy, which they themselves had invented, that the bird was an albatross, and so the controversy continued within the new Service.

From the start, however, even Admiralty Orders stated that the badge was that of an EAGLE and the controversy should never have arisen.

If examination were made into the wording of the R.A.F. crest it would be found, in a Minute of an Air Council Meeting in 1918, that it is described as follows: "In front of a circle, inscribed with the motto, 'Per Ardua ad Astra', and ensigned with the Imperial Crown, an Eagle, volant afrontee, the head lowered and to the sinister." After submission to the College of Arms on January 23rd 1923, having received His Majesty King George V's approval, it was registered on January 26th, the same year.

Next month we shall discover how the R.A.F. motto, "Per Ardua ad Astra", came to be adopted.

**Next Month**

Following this feature on speed tuning, focused upon the World's fastest 5 c.c. engine, next month's "Know your Engine" will deal with the most powerful 2.5 c.c. diesel for free-flight, the Pete Buskell modified E.D. Racer.

AEROPLANES IN OUTLINE No. 44

By R. J. SILVESTER

HUNTING-PERCIVAL'S

# JET PROVOST

THE JET PROVOST is the outcome of a private venture which was started in 1952 as the P.84, and represents the first British approach to training the *ab-initio* Jet pilot.

Logic behind producing what appears to be an expensive aeroplane for instructing future pilots from scratch, is borne by the theory that (a) unsuitable trainees are soon identified and (b) the all-jet syllabus avoids the present requirements of eliminating piston-engine technique from handling when the pilot passes to advanced flying training on the Vampire, Venom or Meteor. Whether such procedure offers a more economic training period will be determined by the results of the first all-jet courses at present being conducted with R.A.F. Cadets using Mk.I's.

Many of the lessons learned in the production of the Provost T Mk.I were incorporated in XD674, the Jet Provost prototype. In fact, the Jet version uses many standard Provost components, the basic modifications being the fuselage extension to bring the crew weight and cabin equipment forward and so compensate for the Armstrong Siddeley Viper 101 (A.S.V.5.) 1,640 lb. thrust long life jet motor over the centre section.

First flight of a Jet Provost XD674 was made on June 26th, 1954 from Luton Airport with Hunting Percival's chief test pilot, Mr. R. G. Wheldon at the controls. XD694, the Mk.II with stumpy undercarriage was completed in time for a most lively demonstration at the 1955 S.B.A.C. display, Farnborough.

In construction the fuselage is an all-metal structure of light alloy frames and stringers covered with stressed Alclad skin. Floor and bulkheads immediately in front and behind the engine compartment amidships are covered with steel to isolate any fire that may occur.

Mainplane is constructed of pressed alloy ribs and stringers covered with a stressed skin, the roots of the main and subsidiary spars forming a three point-attachment by which the structure is bolted to the fuselage.

Tail unit is of similar construction with pressed ribs, spars and stressed skin, the skin on the movable surfaces being fluted for increased strength.

The tricycle undercarriage on the Mk.I aircraft is retracted pneumatically; the nose wheel backwards, and the piston-engined Provost type main units inwards into the wing and fuselage. On the Mk.II the undercarriage is oil and air sprung, all three units being retracted by a single hydraulic ram via cables and pulleys, the nose unit retracting forwards and the remaining units inwards.

The Viper engine is mounted amidships on two tubular tripod mountings, one on each side. Air is ducted from scoops on the fuselage side adjacent to the cockpit, the boundary layer being ejected below the wings. The jet pipe is dismantled or assembled by means of a "railway" built into the top of the fuselage, after the fuel trap (at the rear of the fuselage) and the clamp ring (at the engine) have been removed. Access to the engine compartment is through four hinged cowlings in the top of the fuselage.

Side-by-side seating is provided in the cockpit, and all flying controls and instruments are duplicated, the engine instruments being installed centrally. For the instructor, the engine, undercarriage, and trim controls are mounted on a central pedestal, whilst those for the pupil are on the left-hand wall. On the Mk.II aircraft a simplified panel is being devised wherein the instruments are not duplicated.

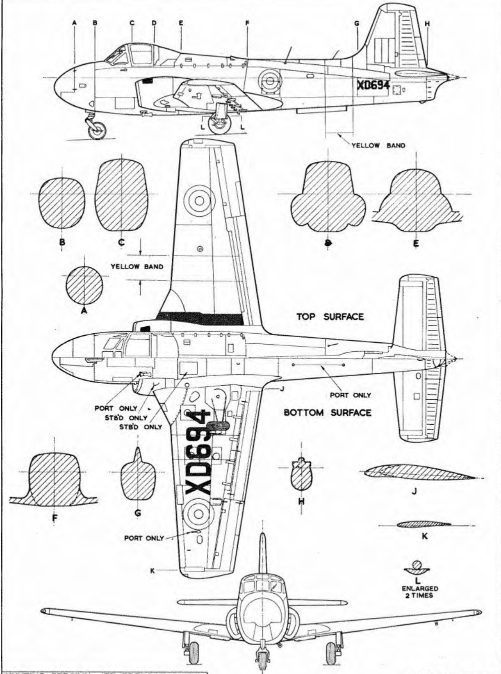
Ten Mk.I aircraft have been built and nine of these bear the serial numbers XD674 to 693. Standard trainer colour scheme of silver over-all with yellow identification bands on the fuselage and wings is used in conjunction with the normal R.A.F. roundels.

The tenth machine, a civil demonstrator, bears the registration letters G-AOBU in blue with white outline. It is silver over-all with a white top to the fuselage including the fin and rudder, the white and silver being divided by a blue line running the complete length of the machine. Within this line, at the nose, the name Hunting Percival in white script with "Jet Provost" in red block letters outlined in white is painted.

The only Mk.II aeroplane flying at the time of writing carries the serial number XD694. The colour scheme is as previously described for service Mk.I's and the very latest modification is a "duck's tail" rear fairing, dotted on the drawing.

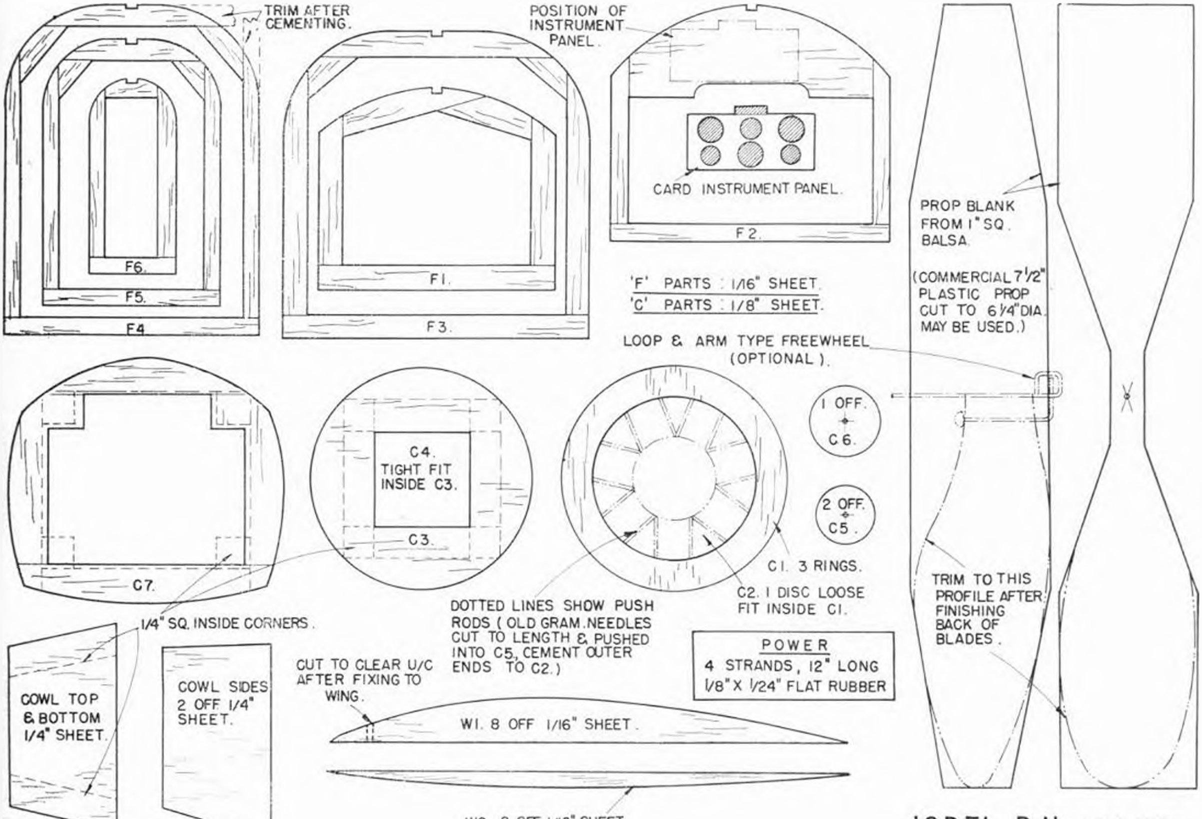
| | Mk. 1 | Mk. 2 |
|---|---|---|
| Length ... ... | 31 ft. 11 in. | 31 ft. 10 in. |
| Span (mainplane) ... ... | 35 ft. 2 in. | 35 ft. 2 in. |
| Span (tailplane ... ... | 13 ft. 6 in. | 13 ft. 6 in. |
| Track | 10 ft. 1½ in. | 10 ft. 8 in. |
| Height ... ... | 12 ft. 8 in. | 10 ft. 1½ in. |
| Engine: | A.S.V.5. | A.S.V.8. |
| Max. speed below 10,500 ft.: 380 knots | 0.7 mach. | |
| Max. speed above 10,500 ft.: 360 knots | 0.7 mach. | |

*Heading shows prototype Mk. I in civil guise. Undercarriage compares with prototype Mk. 2 below, also shows tip tanks. Next model will probably be a one-piece windscreen as seen in H.P advertisements. All photos by courtesy of Hunting Percival Aircraft Ltd.*




HUNTING PERCIVAL JET PROVOST. T. MK.2

"F" TYPE 1/72ND SCALE REPRINTS OF THIS DRAWING AND "A" TYPE 1/48TH SCALE TYPE DIE-LINE PRINTS ARE AVAILABLE PRICE 6d. AND 1/- RESPECTIVELY FROM AEROMODELLER PLANS SERVICE




JODEL D11 FULL SIZE

*Jonathon Dubery borrows Pop's Wartime Helmet ready for a spot of flying*

## Build yourself a French lightplane in miniature—The

# JODEL D. 11

### by Vic Dubery

Ready to start?—All you need is 1/16th sheet and some scrap 1/8" and 1/4", plus wire, wheels and prop.

**Wings.** Transfer the patterns in the lower half of drawing overleaf one by one on to 1/16 in. × 4 in. sheet and cut out. Round off edges and corners, and put tailplane and rudder on one side. Make 8 ribs W1. Dampen the top surface of the large wing piece and pin down over ribs to dry. Treat the outer panels similarly using two ribs each, making sure you have left and right tips. Cement the two permanent ribs in place and discard the others. Using the sanding block, square off the ends of the centre section. Do the same with the inner ends of the tip pieces, holding the sanding block vertically while the tips are propped up 1¾ inches. This will ensure a good joint when you cement on the outer panels next. If you do not trust the joints, cement a strip of ½ in. wide fabric under it.

**Fuselage.** Build up on the plan formers F1 to 6. While these are drying thoroughly cut from 1/32 in. sheet two panels A, being sure to mark on the "inside" (left and right panels) the dotted lines. Place on flat surface marks uppermost, straight edges beside each other and, holding down with ruler, edge on the first "bend" line, roll a pencil under the sheet until a very faint crackling noise begins and STOP. Now shift ruler to other "bend" lines and repeat. Add rear peg reinforcement and make hole. Join both insides squarely to F1 and add 1/8 in. square tail post. Make sure all is square by standing fuselage up on former F1 and checking for symmetry. Add F2 to 6 in that order making sure that bottom edges are in line with bottom of sheet sides. Prepare 2 panels each off B and C and butt-join pairs at edge shown, covering with 1/32 in. × 1/8 in. strip. Dampen the opposite side to the strip all over and wait for wood to curl. Then place B's centre strip in slots of formers F1 and F2 and check that edge of panel does not overlap sides when held down tight over formers. If necessary trim slots in formers or edges of B. When satisfied, cement formers and B's edges and hold in place until dry, taking care not to distort fuselage. Now proceed in the same way with panels C.

Cement together the square made of ¼ in. sheet Cowl parts with ⅛ in. square reinforcement. When quite dry the open ends are squared off with the sanding block and the wide end cemented to C7. If all is satisfactory add C3 to the front. Make up front of cowling as shown on plan, omitting the push rods until later when the inside of cowl has been painted matt black. Cement this to rest of cowl and carve and sand to shape. Bush for prop shaft, then cement complete cowl to F1.

If you don't feel up to tackling the prop shown, use a Keilkraft 7½ in. plastic with ½ in. trimmed off the tips.

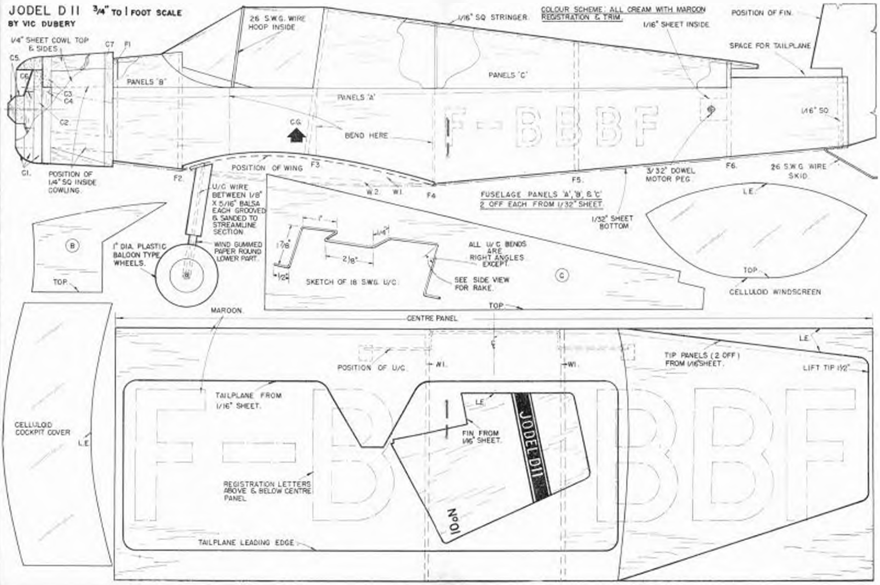
Prepare cockpit and windscreen pieces from thin celluloid but do not cement in place until colouring is complete.

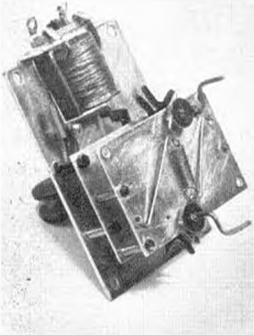
Bend undercarriage wire so that the legs are vertical as seen from the front and raked forward according to the side view. Cement in place and add leg parts as detailed.

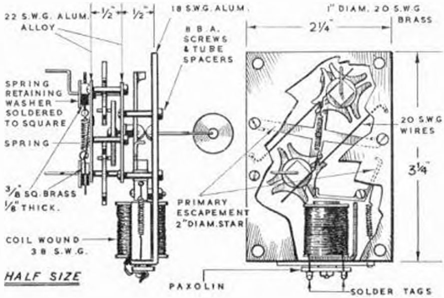
**Finish.** Sanding sealer with a drop or two of castor oil and equal volume of french chalk are used as a one-coat filler. When thoroughly dry, rub down with 00 paper keeping the fingers behind all parts being rubbed. Cut out an approximately shaped full-length fuselage bottom piece from 1/32 in. sheet and prepare one side of this also. When satisfied (and do not attempt a grain-free finish), the wing, tailplane and rudder should be cemented in place, the latter being slotted in up to the tail post and set in line with the left side of the fuselage. Make sure all is true as viewed from the front, if necessary by packing pieces. Fit ribs W2 under W1 to conform with fuselage shape, add the fuselage bottom, and give the 1/32 in. edges of this a little sealer mixture, sanding when dry. If your model now weighs less than 2 ounces you can colour dope and trim (the long trimming stripe on the fuselage conveniently hides any flaws in the butt-joining of sheet). Cowl interior (but not push rods) is matt black, also lower part of undercarriage and wheels.

**Flying.** Power depends on your prop but start with four strands ⅛ in. flat rubber 12 in. long. Before flying, check for glide, ballasting if necessary by means of small slivers of lead forced into the nose plug. Add 1/32 in. sidethrust and downthrust before beginning power flights, adjusting further by easy stages. When satisfied you can then give yourself a pleasant surprise by stretch-winding (not more than 500 turns) and launching on a calm day over soft grass. This model is very lively. Fine trimming is achieved by slight warping of flying surfaces.


**more full-size drawings overleaf**

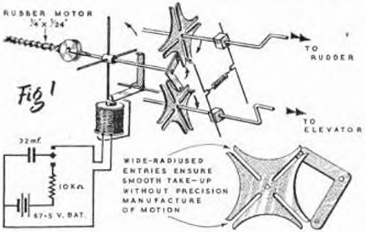

JODEL D11 3/4" TO 1 FOOT SCALE
BY VIC DUBERY
1/4" SHEET COWL TOP & SIDES
C5.
C6.
C7
F1
C3
C4
C2.
C1.
POSITION OF 1/4" SQ INSIDE COWLING.
26 S.W.G. WIRE HOOP INSIDE
PANELS 'B'
1/16" SQ STRINGER.
COLOUR SCHEME: ALL CREAM WITH MAROON REGISTRATION & TRIM.
1/16" SHEET INSIDE
POSITION OF FIN.
SPACE FOR TAILPLANE
PANELS 'C'
PANELS 'A'
F-BBBF
1/16" SQ.
C.G.
BEND HERE
POSITION OF WING
F2.
F3.
W2.
W1.
F4.
F5.
3/32" DOWEL MOTOR PEG.
F6.
26 S.W.G. WIRE SKID.
FUSELAGE PANELS 'A', 'B', & 'C' 2 OFF EACH FROM 1/32" SHEET.
1/32" SHEET BOTTOM
L.E.
U/C WIRE BETWEEN 1/8" X 5/16" BALSA EACH GROOVED & SANDED TO STREAMLINE SECTION.
WIND GUMMED PAPER ROUND LOWER PART.
1" DIA. PLASTIC BALOON TYPE WHEELS.
B
TOP.
1"
1/4"
1 7/8"
2 1/8"
1/2"
SKETCH OF 18 S.W.G. U/C.
ALL U/C BENDS ARE RIGHT ANGLES EXCEPT.
SEE SIDE VIEW FOR RAKE.
C
TOP.
CELLULOID WINDSCREEN
TOP.
MAROON.
CENTRE PANEL
POSITION OF U/C.
W1.
W1.
TIP PANELS (2 OFF) FROM 1/16" SHEET.
L.E.
LIFT TIP 1 1/2"
TAILPLANE FROM 1/16" SHEET.
L.E.
FIN FROM 1/16" SHEET.
JODEL D11
100N
CELLULOID COCKPIT COVER
L.E.
REGISTRATION LETTERS ABOVE & BELOW CENTRE PANEL
TAILPLANE LEADING EDGE.

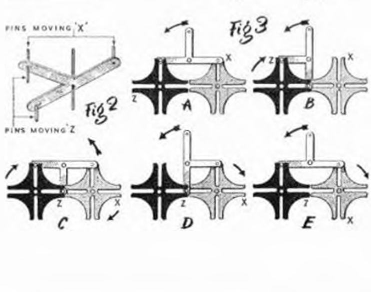





## *Including a full description of a double-control escapement by Peter Lovegrove*

# RADIO CONTROL NOTES Conducted by Howard Boys




AN INTERESTING double control escapement actuator has been sent for description by Mr. Peter Lovegrove, whose home is at Abingdon. While operating two controls, it uses only one rubber motor, and is, of course, for single channel working. It was used in a 60-inch span functional type model powered by an E.D. 3·46 and required ¼ in. by 1/24 in. rubber for the motor. Such a motor necessitated the fitting of a capacitor discharge system for operating the escapement. This used a 25 mfd. capacitor, a series resistance of 10,000 ohms and 67½ volts, though a lower voltage might prove enough.

The actuator is illustrated in *Fig.* 1, and it will be seen that the escapement shaft carries part of a modified "Geneva motion". The two control shafts each carry a slotted wheel with which the pins on the other shaft engage in turn. These pins are at 90 degrees to each other and rotate 90 degrees at a time due to the four arm escapement. Two steps of 90 degrees will turn a control shaft two steps of 90 degrees, and then the pins go on to the next control shaft two turn that to steps. While one shaft is being turned, the other is more or less free to rotate, so this free position should be made the neutral. To help the positioning of the shafts, there is a brass square soldered on each on to which a wire rod is held by means of a spring. While these parts should be made with care, precision is not necessary.

The actuator illustrated was Mr. Lovegrove's first effort, and has been improved in a second version which is a little more compact, this being achieved by placing the shafts closer together.

The driver on the escapement shaft is shown in *Fig.* 2 and is made with a pair of pins each side. The slotted wheels are put one in front and the other behind this, and the operation is seen in the series in *Fig.* 3. The actuator was fitted well forward in the model, and coupled to the control surfaces by wires as *Fig.* 4. With the cranks facing forward, it was possible to use a long motor running to the tail,

making for easy winding. The control sequence was, *Right, Down, Left, Up*, with a neutral position in between each.

The transmitter was switched with a simple "beep-box" as shown in *Fig.* 5. With a capacitor system the transmitter has to be switched on for a moment when passing from one position to another. The escapement which weighs 3½ oz. has never skipped a position, and with a properly working transmitter and receiver provides a system that is absolutely reliable.

When writing, Mr. Lovegrove asked how to cure interference caused by electric motors. It does sometimes happen that when a small electric motor is used to operate a control it does affect the receiver. Some receivers such as the "AEROMODELLER" hard valve, seem more prone to this interference than others. So far the writer has only used electric motors with an XFG 1 valve and did not have any trouble. When the problem first came to light Doug. Bolton was asked, since the "AEROMODELLER" hard valve receiver was developed from his original design, and his suggestion was a ·01 mfd. condenser across the motor terminals, and a radio frequency choke in the positive battery lead, at the motor. This is also the system suggested for the Fenners-Pike actuator, *see Fig.* 6. (This capacitor and condenser business is not very good, the two words meaning the same. Condenser has been in use so long it is hard to get rid of it, and not everyone approves of capacitor.) If the writer had this interference trouble, and the choke and condenser did not cure it, he would try putting the motor, condenser, and choke all in an aluminium box with one motor terminal earthed to the box. The other terminal lead would go through the R.F.C., and then through a small hole in the box. It must be remembered that a radio frequency choke in such a position will need to carry a much heavier current than is usual for these things in model work. In general, about 8 feet of 22 or 24 gauge wire, enamelled, wound on a piece of ¾ in. dowel would be all right. Interference of this type does not seem to upset tone-operated receivers, but only the single valve carrier-operated.

## Interference from Spark Ignition

Another type of interference has been troubling Mr. A. H. Thomas of Plymouth. In this case the ignition system of his Frog 500 causes a large drop in the anode current of his E.C.C. 951.B receiver. The writer has not heard of anyone else having similar trouble, and is therefore unable to prescribe a certain cure. To suppress this type of interference in ordinary motor vehicles a 5,000 ohm resistor is put in the H.T. lead to the plug. On full-size aircraft screened leads and plugs are used, and the writer used this system on a twin cylinder vehicle during the war when listening to the B.B.C. Screened leads are available from most radio shops these days, a very popular type being used for television aerial lead in, and usually called co-axial cable. The screening should be as complete as possible, and the screen connected to the metal

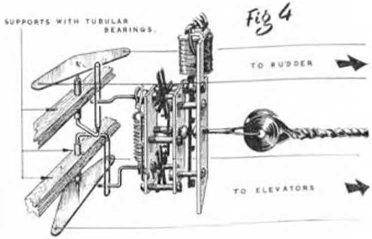
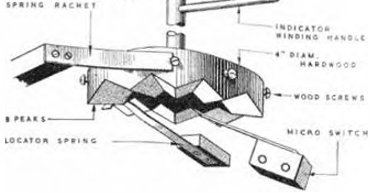


Fig 4

part of the engine. Co-axial could also be used for the battery leads since one of these is connected to the engine frame.

## Effects of Aluminium Dope

Another interesting query has been received from Mr. F. J. Cleare of Ash. Incidentally, lots of young aeromodellers would welcome a man like Mr. Cleare for a father. When his son was called up for National Service he left a couple of dozen models, all with engines, hanging round his bedroom! Well, Mr. Cleare wants to know what will be the effect on the radio of painting the model fuselage with aluminium. The chances are that the fuselage would form a very good screen for the aerial in certain directions, probably when the receiver aerial and fuselage were in line with the transmitter. In any case, it would be best to keep the aerial as far away as possible from the fuselage. To test out the effect on the range of such a model, it would be best to fit a mark/space proportional control system with a fairly mild left turn without signal. The model could then be flown upwind, and at some distance put into a right-hand turn. Lack of range would be indicated by an unintentional left turn which, with

Fig 5


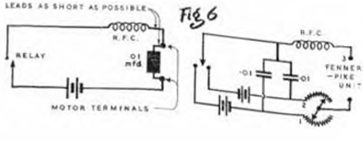
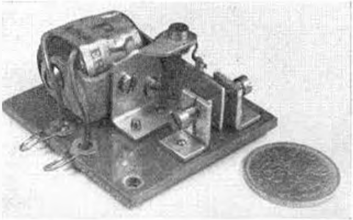



Fig 6



*The Dutch "Typhoon" Relay weighs 1 ounce and has a coil resistance of approximately 5,000 ohms*

the wind blowing homewards would bring the model towards the transmitter where it would come back into range again.

## McQue Crystal Transmitter

Mr. McQue has written to raise a couple of points in connection with his crystal controlled transmitter. (1) The anode current of the P.A. valve (V2 in *Fig.* 1 of March issue) is not a negligible amount compared with the filament current when a series connection of the filaments is used, so a balancing resistor is necessary between the centre tap and the positive end (earth in this case). That is pins 7 and 8. He has found that 120 ohms is a reasonable value with the four valves he has tried. (2) Neutralising may be easier if the P.A. anode H.T. supply is disconnected as well as the screen supply.

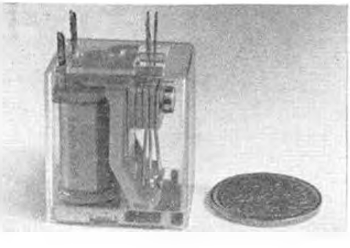
Mr. McQue is also building a new fuselage for his R6b. This time the sides are of $\frac{1}{32}$ in. ply and parallel to the nose giving greater strength and battery accessibility, yet it does not seem to be any heavier. A tricycle undercarriage is being fitted.

Another reader, Mr. W. G. Rowell of Dundee, says he also has had more success with the XFG1 valve for model aircraft receivers, than hard valves, though he has had success with the hard valve in model boats.

## Typhoon Relays

Some time ago the writer bemoaned the fact that no one had put on the market a relay similar to the old ex-Government SCR.522, but smaller and lighter. Mr. Veenhoven sent along a small relay that was similar in many respects. Unfortunately, the armature was bent at right angles which put it out of balance so that slight vibration in some directions would operate the contacts. This immediately condemned it from the writer's point of view, and he told Mr. Veenhoven. Some Dutch modellers also made suggestions for improving the relay, and recently a modified design has been sent for test. It is a robust relay built on a substantial base of paxolin, which can be bolted to a receiver, or slung separately on rubber bands. The armature is well balanced and held with a spiral spring soldered in place. This type of spring, besides being good from a balance point of view, ensures a good connection for the current in the servo circuit. A friction-locked bush with a screw head in the frame is used to adjust the spring. The silver-tipped contact screws are also locked by friction, which is a very convenient and satisfactory method.

The writer's test was to put it in a receiver circuit with the anode current adjusted to vary from 1·2 ma. to ·8 ma. from a transmitted signal. The transmitter was pulsed about twice per second, and the relay was easily adjusted to respond. The relay was held in the hand and shaken violently in various directions, but it still clicked away quite happily in sympathy with the transmitter. Such a response shows that the relay would be satisfactory in most normal receivers, hard or soft valve. The writer would not hesitate to use it in one of his own receivers, which is saying something.



## Sid Allen

There seems a deeper friendliness among radio control aeromodellers than among many other sections of the community, perhaps because they are dependent on each other's good behaviour to allow each to fly in turn safely. This friendliness is well illustrated by a letter from Mr. E. L. Rockwood, the Secretary of the Pacific Radio Control Society, regarding the late Sid Allen. He says: " . . . We felt somehow that we knew him, though only through the pages of the "AEROMODELLER", about as well as we did some of the prominent modellers in this large country of ours, with whom our contact was really no closer.

"We got the impression, too, that Sid Allen was one of the true *afficionados*, as our Guatemalan correspondents would say, and not merely a "Sunday flier", as are so many modellers, so we recognise that his passing represents a real loss to his associates."

Sid will also be remembered for his participation in the cross-channel radio-controlled model flight.

*Left: Interesting Siemens relay now available in Germany is small in size (note 6d.) and light in weight. Beautifully made, it has a coil resistance of 5,800 ohms, but needs approximately 2 m/a for contact change. Price works out at approximately £1 and although not suitable for the single valve circuit it is ideal for the average two valve set with correspondingly larger current change.*

# 1956 Golden Wings Contest

THE RESOUNDING success of our Golden Wings Contest, inaugurated during 1955, encourages us to repeat this stimulation of the younger aeromodellers of the United Kingdom, and the regulations for this year's event will be found below.

Since last year's contests the GOLDEN WINGS CLUB has come into being and already embraces many hundreds of keen aeromodellers, all of whom qualify for entry to the 1956 series. For those juniors who may yet be unaware of the existence of the Club we would point out that membership, for which there are no fees, is available to every purchaser of the Golden Wings glider plan (price 2s. 6d. post free) who has not yet reached the age of sixteen—membership expiring on December 31st of the year in which that "ripe old age" is reached.

An order/membership application form appears on page 276, and it is most important that date of birth is given, thus enabling the membership card to be completed and forwarded with your plan. Each member receives an individual Membership Card, Lapel Badge, and special Transfers for application to his Golden Wings model, all these amenities being entirely free of charge.

The Golden Wings design was especially prepared by expert Vic Smeed, and forms the ideal introduction to the fascinating hobby of aeromodelling, tolerances being such that quite average construction and handling will produce good results. The fully-detailed working drawings are accompanied by well-illustrated step-by-step building instructions, and form the most highly informative design available on any market.

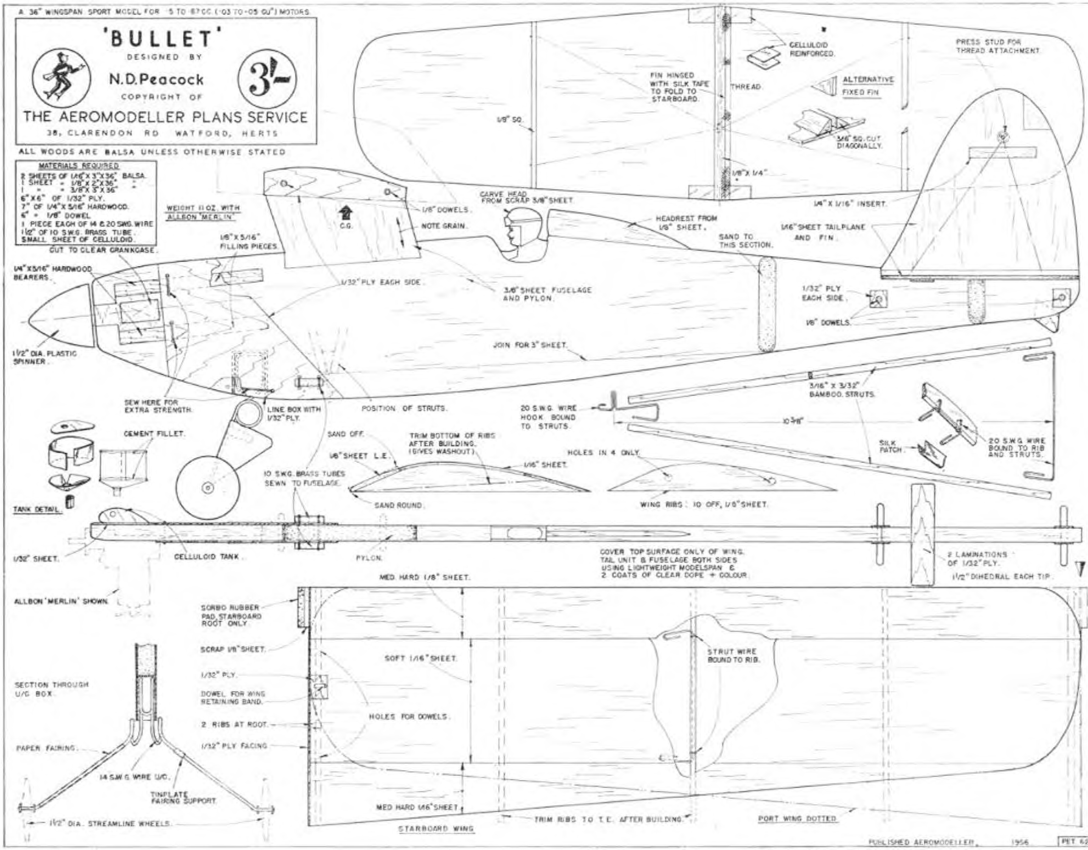
If you have not yet built a Golden Wings glider, and would further desire to become a member of the biggest club in Great Britain, complete the order form on page 276 and qualify immediately for entry into this year's contests.

A magnificent prize list awaits those who qualify for the final contest, and every modeller selected for the second round will receive a prize. In addition, his fares to and from the venue and accommodation will be paid by the organisers. Finalists are selected on a district basis, thus ensuring that every part of the country is represented. (Last year finalists came from places as far apart as Lanark, Newport, Oxford and Mere, Wilts: ages ranging from nine to just under sixteen.)

Every member of the Club will be supplied with an official entry form, and particular notice is drawn to the closing date by which these must be returned. Confirmation that the flight times submitted are correct is most important, and it is advisable that the co-operation of local club officials be solicited where this is possible.

## RULES

1. The contest, which will be conducted in two rounds, is restricted to members of the GOLDEN WINGS CLUB, such persons being under sixteen (16) years of age at December 31st 1956, and resident in the United Kingdom.
2. Entries for the Elimination Contest (Round 1) must be made on the official entry form supplied to members, and the flight records entered thereon must be certified as correct by a responsible adult.
3. Models flown shall be the standard "Golden Wings" glider design, and have been built entirely by the entrant.
4. The minimum weight of the mode in flying trim must be 5 ozs.
5. The model must be launched by the entrant by means of a towline with a maximum length of 164 feet. A pennant for timing observation of not less than 24 square inches must be attached to the line not more than 18 inches from the towing ring.
6. Duration of a flight shall be timed from the moment of release from the towline until the model comes into contact with the ground or disappears from view.
7. Any number of flights may be made, but only three may be recorded on the Entry Form, these to be consecutive flights and made on the same day.
8. Entries must be received at the "AEROMODELLER" offices, 38 Clarendon Road, Watford, Herts, not later than the first post Friday, August 10th, 1956.
9. Selected competitors from Round 1 will be invited to attend a final contest where the prizewinners will be decided.
10. The decision of the judges is final.



A 36" WINGSPAN SPORT MODEL FOR ·5 TO ·87 CC. (·03 TO ·05 CU") MOTORS.
'BULLET'
DESIGNED BY
N.D.Peacock
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE
38, CLARENDON RD WATFORD, HERTS
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
MATERIALS REQUIRED
2 SHEETS OF 1/16" X 3" X 36" BALSA.
1 SHEET " 1/8" X 2" X 36" "
1 " " 3/8" X 3" X 36" "
6" X 6" OF 1/32" PLY.
7" OF 1/4" X 5/16" HARDWOOD.
6" " 1/8" DOWEL.
1 PIECE EACH OF 14 & 20 SWG. WIRE
1 1/2" OF 10 S.W.G. BRASS TUBE.
SMALL SHEET OF CELLULOID.
WEIGHT 11 OZ. WITH ALLBON 'MERLIN'
CUT TO CLEAR CRANKCASE.
1/4" X 5/16" HARDWOOD BEARERS.
1/16" X 5/16" FILLING PIECES.
C.G.
1/8" DOWELS.
NOTE GRAIN.
1/32" PLY EACH SIDE.
CARVE HEAD FROM SCRAP 3/8" SHEET.
3/8" SHEET FUSELAGE AND PYLON.
HEADREST FROM 1/8" SHEET.
SAND TO THIS SECTION.
1/16" SHEET TAILPLANE AND FIN.
1/32" PLY EACH SIDE.
1/8" DOWELS.
1 1/2" DIA. PLASTIC SPINNER.
JOIN FOR 3" SHEET.
1/8" SQ.
FIN HINGED WITH SILK TAPE TO FOLD TO STARBOARD.
THREAD.
CELLULOID REINFORCED.
ALTERNATIVE FIXED FIN
3/16" SQ. CUT DIAGONALLY.
1/8" X 1/4"
1/4" X 1/16" INSERT.
PRESS STUD FOR THREAD ATTACHMENT.
SEW HERE FOR EXTRA STRENGTH.
LINE BOX WITH 1/32" PLY.
POSITION OF STRUTS.
20 S.W.G. WIRE HOOK BOUND TO STRUTS.
3/16" X 3/32" BAMBOO STRUTS.
10 3/16"
SILK PATCH.
20 S.W.G. WIRE BOUND TO RIB AND STRUTS.
CEMENT FILLET.
TANK DETAIL.
SAND OFF.
1/8" SHEET L.E.
TRIM BOTTOM OF RIBS AFTER BUILDING. (GIVES WASHOUT.)
1/16" SHEET.
HOLES IN 4 ONLY.
10 S.W.G. BRASS TUBES SEWN TO FUSELAGE.
SAND ROUND.
WING RIBS: 10 OFF, 1/16" SHEET.
1/32" SHEET.
CELLULOID TANK.
PYLON.
COVER TOP SURFACE ONLY OF WING. TAIL UNIT & FUSELAGE BOTH SIDES USING LIGHTWEIGHT MODELSPAN & 2 COATS OF CLEAR DOPE + COLOUR.
2 LAMINATIONS OF 1/32" PLY.
1 1/2" DIHEDRAL EACH TIP.
ALLBON 'MERLIN' SHOWN.
MED. HARD 1/8" SHEET.
SORBO RUBBER PAD STARBOARD ROOT ONLY.
SCRAP 1/8" SHEET.
SOFT 1/16" SHEET.
STRUT WIRE BOUND TO RIB.
SECTION THROUGH U/C BOX.
1/32" PLY.
DOWEL FOR WING RETAINING BAND.
HOLES FOR DOWELS.
2 RIBS AT ROOT.
PAPER FAIRING.
1/32" PLY FACING.
14 S.W.G. WIRE U/C.
TINPLATE FAIRING SUPPORT.
1 1/2" DIA. STREAMLINE WHEELS.
MED. HARD 1/16" SHEET.
TRIM RIBS TO T.E. AFTER BUILDING.
PORT WING DOTTED.
STARBOARD WING
PUBLISHED AEROMODELLER. 1956
PET 626

**Another all - sheet model for .5 - .8 c.c. for tough all-round sport flying . . . by**

## N. D. Peacock


BULLET WAS BUILT to provide a simple all-sheet sports model which would have a reasonable appearance and yet be easy to make. If you are looking for a rest from that super built-up job, this one can be built in a few evenings. It's the sort of model to take along for fun between more serious flying and is very suitable for the newcomer.

The original flies around comfortably with an 8 x 8 Frog plastic to keep the revs on the Merlin in check and to give a nice steady climb. Although the wing loading is around 9½ oz./sq. ft. a quite reasonable glide can be obtained and the job seems pretty rugged; what is of particular interest to the flat-dweller is that it packs up easily for transport.

All sheet construction lends itself to a good finish and in spite of a fair amount of colour dope it weighs a little under 11 oz.

**Wings.**—First cut out the ⅛-in. sheet ribs all the same size as the root rib. Cement two pairs of two ribs together to form the two wing roots. Now space ribs over the plan and pin through the rib "tails". Also put steady pins either side of the rib at mid chord. Pin and cement the ⅛-in. medium hard sheet leading edge strip. This should lie easily on the flattened front part of the ribs. Take the soft 1/16-in. sheet for the centre area of the wing; do not cement to the ribs yet but only along the rear of the leading edge strip.

When set, the part-finished wing may be carefully removed from the building board to enable a good cement job to be made of the ribs. Return the wing to the board after applying the cement and pin down the curvature. Add the trailing edge piece of medium hard balsa and leave to set. Now take the wing off the board and sand down the step formed where the ⅛-in. sheet butts against the 1/16-in. on the top of the wing. This should blend into the curvature. Use a small sanding block and work along facing the L.E.

Sand down the root rib at an angle to allow for the dihedral and fix the 1/32-in. ply wing root facings.

Ignoring the protruding rib tails, cover the top surface of the wing with lightweight tissue. Dope upper and lower surfaces and return wing to building board and allow to dry out thoroughly. Finally cut off the protruding ends of the ribs and chamfer off the rib under surface to the trailing edge. The wing has now a sizeable built-in wash-out of incidence.

Make the wing struts from split pieces of garden cane, bind on and cement the wire attachments and when dry sew the wing and wire to the underside of the appropriate rib.

**Fuselage.**—This scarcely warrants any description except to say that a good firm grade of light balsa should be chosen. Do not omit the binding or sewing through the fuselage especially at the undercarriage well to prevent bursting. Cover fuselage with lightweight tissue, after sanding oval aft.

A vice is useful when bending the undercarriage. Start off with a large hairpin or wire, firm the port to fit the well in the fuselage, then the coils and the rest in turn. The undercarriage should be a good firm plug fit.

The fin is hinged along its base and is retained vertical by means of the thread bracing. This bracing can be detached to permit the fin to fold flat for transport by means of a press-stud. The male portion of the press-stud is slightly recessed in the balsa and cemented liberally. The other half of the stud is tied to the thread. The whole tail unit is covered with lightweight tissue.

Balance the model at the point shown on the plan, this gives a slightly nose-heavy trim for initial tests. Do not increase the positive angle on the tail; any trimming should be done by ballasting either the nose or tail. To do this add weight in the spinner or cut a groove in the top of the fuselage under the tailplane trailing edge and add the weight here, whichever is necessary to give a smooth glide.

# Laminated Sheet Fuselages

## The "inside" story on how to make super-strength Wakefield model fuselages with 2 laminations of 1/32 in. sheet

by ALAN NOBBS

AFTER SEEING E. W. Evan's moulded sheeted Wakefield model at the 1954 team trials it struck me that a streamlined Wakefield fuselage could be made to look good, and at the same time be very strong if it was made up of sheet balsa tubes, and fitted together as a complete fuselage. With the change in the Wakefield cross-section rule it seemed even more desirable, for now a fuselage of a smaller diameter could be made which not only cut down the drag, but would be much lighter if it was to be made up of sheet balsa.

During September of 1954 I started making an experimental fuselage. First I had turned three blocks, two tapered and one of constant diameter, the tapered blocks being for the nose section and the rear parts of the fuselage, the constant block being for the centre portion. In appearance the blocks looked like rolling pins mother used in baking, the diameter of the centre portion being 2¼ in. in diameter and about 20 in. in length, the two tapered blocks being 2¼ in. down to 1½ in. at the tapered V end, length being 10 in. After slightly waxing these blocks I was ready to make the tubes.

My idea was to take a sheet of 1/32 in. balsa and wrap it around the block until it was joined edge to edge, then a sheet of 1/32 in. sheet balsa could be put over and glued to it, thus making a sheet thickness of 1/16nd of an inch. After the whole had been bound with wool and allowed to dry, it would be taken off the block and a tube would result. If the three were made up as such then all I had to do was join them together and, "hey presto", a complete fuselage—or very nearly so.

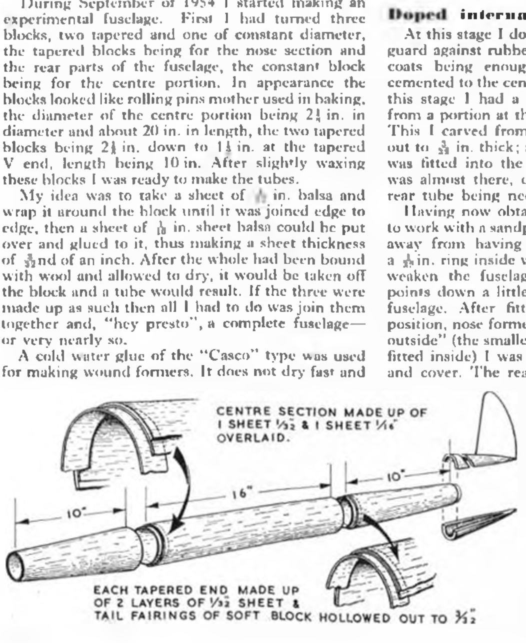
A cold water glue of the "Casco" type was used for making wound formers. It does not dry fast and therefore gives time to work with, also it evaporates and leaves little weight if any at all

The three tubes were made up as described above and left to dry. When dry I took them off the blocks and trimmed down to size. Next a piece of 1/32 in. sheet, half an inch wide, was inserted into the centre portion tube at each end to form a ring, being cemented in the tube up to a quarter of an inch wide, thus leaving a flange for the two other tubes to be fitted.

### Doped internally

At this stage I doped the inside of the fuselage to guard against rubber lubricant soaking in, two thin coats being enough. The end tubes were now cemented to the centre tube and allowed to dry so at this stage I had a fuselage almost complete apart from a portion at the rear for the tailplane to fit to. This I carved from soft block balsa and hollowed out to 3/32 in. thick; again a ring of 1/32 in. sheet balsa was fitted into the rear tube, and now a fuselage was almost there, only a fairing to the top of the rear tube being needed.

Having now obtained the basic fuselage, I went to work with a sandpaper block to take the sharpness away from having straight tubes. As I had put a 1/32 in. ring inside where the joints came, it did not weaken the fuselage unduly when I sanded the points down a little to give a smooth curve to the fuselage. After fitting a cabin for a high wing position, nose former, and an undercarriage "on the outside" (the smaller diameter did not allow it to be fitted inside) I was ready to fit the rear motor peg and cover. The rear motor anchor is made up of 1/16 in. ply bent to the contour of the inside of the fuselage and well cemented. The whole of the fuselage was now ready for covering, and in this case I used heavy Modelspan tissue, two coats of dope and it was complete.



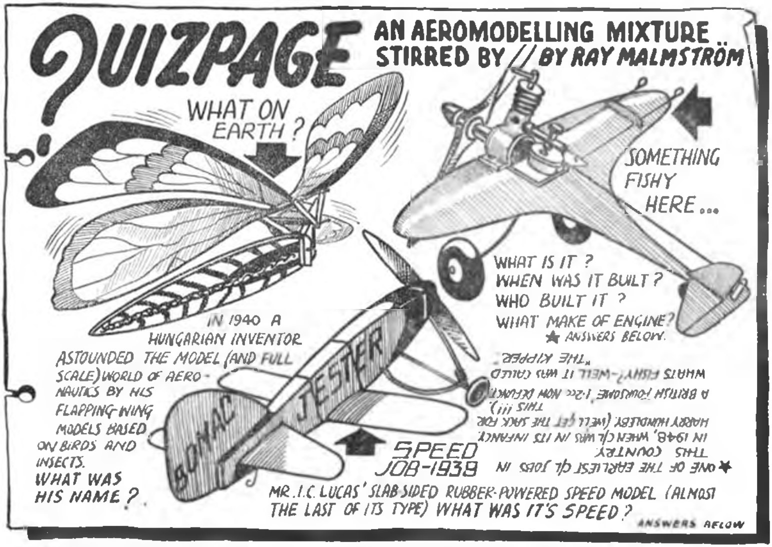

*How the three fuselage sections are joined with connecting rings and the tail cone made up of hollow block, is clearly demonstrated in this sketch*

The finished job really was strong though a little on the heavy side by the normal standards then, the weight being in the region of 2¼ oz. with the fin and underfin attached. I used a forward fin on that version, but it seemed to me to be too strong for what was needed. Incidentally I flew the completed model at Rufforth in October last and stalled in under full power and the fuselage had not even a mark on it, only the prop blades "went for a Burton".

At the beginning of 1955 I made a second version, this time using two layers of $\frac{1}{32}$ in. sheet for the nose and rear tubes. Again the centre tube was $\frac{1}{16}$ in. plus $\frac{1}{32}$ in. sheet and this model was shown in a photo in the "AEROMODELLER" for June, 1955. The fuselage came out lighter and with the present-day rules in the Wakefield seems ideal. Considerable interest has been shown, and now the members of Halifax Model Aero Club are starting to build them, as these fuselages can be made in a short time. The three sections are easily made in a night, and whilst light, are really very strong. No formers are needed apart from the $\frac{1}{32}$ in. strips to join the tubes together; dope on the inside is a must if the lubricant is not to soak in to the skin and add weight, but apart from that all is plain sailing.

Anyone contemplating making a fuselage this way can do so with confidence; the only points to watch are that you pick some soft white balsa so it will go round the former easily, and careful not to get surplus glue on the blocks, or the tube will stick. Lightweight tissue and two or three coats of thinned dope are all that is needed; grain of the balsa throughout is lengthwise and when joining three inch sheets together to wrap round blocks, balsa cement will do the trick in butt jointing them. The weight of the second version was under 2¼ oz.

*Another exponent of the sheet fuselage is Roy Chesterton of Northern Heights Club, seen with his '55 Wakefield. Model has a taut motor driving a free wheeling folder propeller. Wing has a thin NACA section*




QUIZPAGE ANSWERS. Ornithopter inventor was Alexander Svachulay. Ian Lucas's rubber speed job flew at 34.375 m.p.h.

# World News

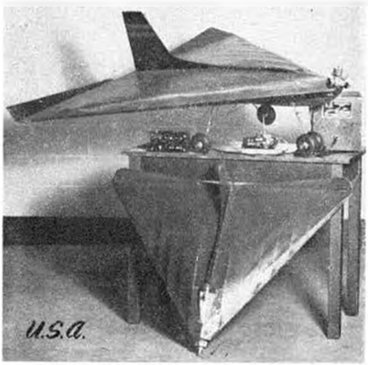
NATIONALS NEWS from the Southern Hemisphere continues to flow in: but there's a twist to the **Argentina** meeting—it had to be postponed from the original Easter date because of a local polio epidemic. In **South Africa** Brian Partridge, top grade modeller of our acquaintance from Jo'burg, cleaned up most events in an all-out try for the Championship Trophy, which he collected with full honours. Brian was 1st in Class A Glider (350-*sq. inch Inch Worm*), Jetex (*Arrow* 100), ½ PAA (*PAAmaster*), AB PAA (*Gold Dust*) and Rubber (*King Wakefield*). He was also 2nd in Class A FF power and team racing and 5th in Class B team racing—also flew the racers in speed! A *Kiwi* won F.A.I. power and an *Amazoom* Class A power whilst heaviest mortality rate was among the six kit built *City Boys*.

Full details of the **New Zealand** Nats from competing enthusiasts relate of long distance chases, O.O.S. flights with chuck gliders, A.P.S. designs in the lead—and most unfortunate loss, the official photographer had his place burn down after the event! So we have no pics! There were 236 individual contestants for this 8th Nats at Bell Block, New Plymouth, and of the results we pick R. Wong's ten-mile team race figure of 7 : 23·6 for 2·5 c.c. as being most creditable. In fact, it's so fast we can hardly believe it—or was it for ten kilometres? All finalists were using Oliver Tigers. Being a New Year's event the N.Z. Nats cannot go by without extra celebration, so the '56 season was well and truly seen in with a red-hot Dynajet screeching round at midnight, and others occupied themselves using pressure cans and squeeze bottles in liquid battle.

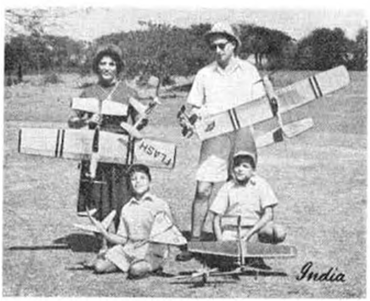
Big news from New Zealand is that Frank Bethwaite has pushed the R/C duration record so high that few could ever hope to beat it. New figure is 7 hours 37 mins., after which the model was landed 70 yards from launch point. Flown on April 2nd, this glider flight constitutes a claim to the F.A.I. for the absolute duration record and by the time of confirmation we hope to be able to give full details.

The 9th Nats in **Australia** were beset with problems as the location was switched to Brisbane, Queensland, from N.S.W. only a few weeks before the date. One hundred and fifteen individuals competed in stormy tropical conditions that lost many a model. Long distance traveller from Tasmania, Ken de Bomford, won free-flight scale for the second year with his *Norseman (see picture)* and Champion of Champions was Ron Bird of Victoria. Wakefield team is R. Bird, A. Cooper, J. Fahey and, hold it . . . globetrotter Adrian Bryant. And we thought he'd disappeared into the depths of sinful Kensington! Adrian also provided the entertainment at the prizegiving dinner—bet he had a tale to tell after working his way through Europe, and the States. Power team is to be W. R. Morrison, R. Bird, J. Palmer and N. Harding, and we gather there's a chance of a few personal Aussie appearances at the finals in Europe.

From **Finland** we learn that a team of three power fliers may come to the Cranfield World Champs, and






*Top to Bottom: Ron Smith's radio Deltas are big, lower one is 36-in. span. Silk covering is doped bright orange with green trim, see text for details. Next is Silk-Screened pennant issued to N.Z. Nationals competitors in bright red, gold and black. Twin Webra Mach I's power Stan Hill's 800 sq. inch contest model arranged for vertical take off. With one engine alone, carrying the other for ballast, it just meets the '57 F.A.I. rules. Bottom is G. Chaplin and his 100 per cent. aeromodelling family of Bansberia, Hoogly, India. Mrs. Chaplin is a regular winner at the All-India Rally with her speed models*

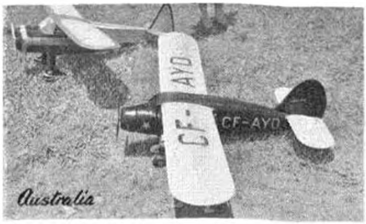
considering they have been having fly-offs to decide power winners in spite of snowy conditions, they may yet come over and do an "Ellila" on us. Ginstrom, Raulio and Pimenoff each gained full maximums at the April 4th meeting at Hango.

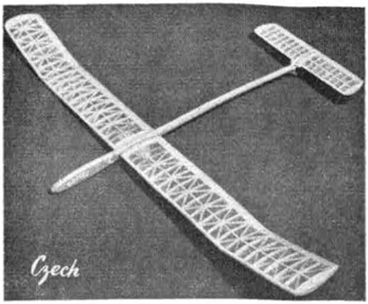
Others hoping to attend Internationals are from **Israel**, where there is concentration on A/2 and a team should have been picked by the end of March in the final concluding selection trial after two preliminary contests. They'll be interested to know that the **Italian** administration has very wisely combined the planned World Championships for both speed and A/2 Glider, running *both* at Florence on new dates of September 26th to 30th. All Internationalists please note.

There's a most enthusiastic group of radio control fliers at "top-left State" **U.S.A.**, which is Washington. They fly all types including various size versions of the A.P.S. R6-B, and among them is Ron Smith of Lynnwood. He has a set of radio controlled Delta designs, as pictured opposite, and tells us they are well nigh impossible to stall. Large one (above in picture) has 1,000 sq. in. wing, 2 degrees anhedral and a 13 ounce/sq. ft. wing loading. Fox 29 engine has Dmeco servo-operated Bramco throttle while rudder is moved by Bonner compound escapement. Elevator has a 30 degrees movement range and is trimmable by a Babcock escapement. Radio is a British E.D. 3-Channel outfit. Smaller version is rudder only with Babcock equipment and is 3 ft. span with a Cub 2·5 c.c.

Both models have proven to be very strong and able to take much punishment thanks to their compact shape and we wonder why (in view of the established popularity of the Delta in Britain) there are no comparative stimulating experiments this side of the Atlantic. It's time someone lifted radio control out of its circuit-heavy rut in model design and if anyone doubted the existence for a demand for something "new" let them consider the fact that the New Zealand design R6-B is now flying in practically every country in the world where aeromodelling is practised—an honour which is not only unique, but worthy of the model.

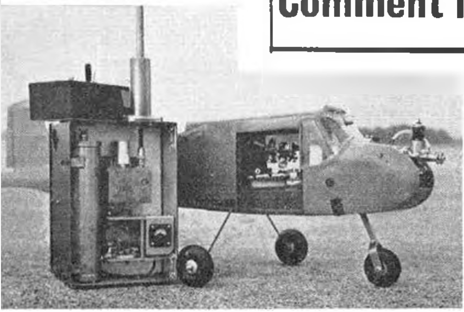
Parnell Schoenky, whose Helicopter features in AEROMODELLER and *Aeromodeller Annual* have sparked off so many free-lance models, writes from Missouri to offer a correction to March World News. We stated that there were 50 licensed A.M.A. modellers in the State, whereas Parnell points out that there are 182 . . . Sorry about that; but Parnell also agrees with our view that the independent modellers outnumber the contest types by a wide margin. Distance between centres and regular meetings make difficulties in all the large countries—a fact often overlooked when comparing the compact British model organisation with those in the Commonwealth and Americas.





*Top: Free-Flight scale winner for two years at the Australian Nats is Ken de Bomford's Noorduyn Norseman, up from Tasmania. Behind is a Howard DGA-8. Next glider is an A/1 built in Czecho by Kamil Brauner which maintains a steady 1:50 average from a 50 metre line. Anti-warp construction looks involved, but is actually simple. Bottom: In conjunction with the Ministry of Transport and Waterways which includes Civil Aviation, the Fokker Company, Netherlands Aero Club and publishers of "Handig Bekeken", a National solid model contest for replicas of the Fokker Mach Trainer and Friendship Airliner was organised last year. Here, representatives judge the entry. British manufacturers would probably find such an event profitable in locating solid modelling talent*



*Claude McCullough continues*

# Comment from the Flying Line...

HAROLD DEBOLT demonstrated successful outside loops as early as the 1953 Nationals at Philadelphia. Considering that a large number of builders have since duplicated his pioneering results and that the A.M.A. point schedule give a fat 36 points for 3 consecutive outsides, it is surprising that the outside loop as yet plays little decisive part in competition flying.

Alex Schneider, in winning first at the 1955 Nationals in Multi-Control, did just about everything in the book from proto-take-off to near perfect spot landing—but no outside loops (or rolls). If my observation was correct, the 5th place winner, Dale Root, flying a semi-symmetrical section shoulder wing job, was the highest placing entrant performing an outside loop.

DeBolt's outside looping has been done in the main with thick full-symmetrical wing section ships and most other attempts at duplicating his results have been with this "Over and Under" style of design. The most important requirement of symmetrical wing section R/C jobs is that the wing loading be kept as light as possible. Harold has given 15 ounces per sq. ft. as an advisable maximum and now has a .35 powered 1,300 sq. in. giant with a loading of only 12 ounces per sq. ft.

A symmetrical wing section airplane will outside loop quite easily—simply apply full down and presto! It does not even seem, as one might suspect, a manoeuvre requiring much power since most jobs will also outside loop in the glide with nearly as much ease. U-control style vertical and horizontal eights, combining as inside and outside loop are frequently seen—though just for amusement, since the A.M.A. does not award points for this caper. And of course the streamline airfoil is tailor-made for easy inverted flying.

Although creditable performers, there inevitably seems to be something missing in right side up flying and this may be a contributing factor to the lack of widespread competition success that symmetrical wingers have experienced. Some of my own attempts with high wing loadings have been particularly tricky To inside loop for example, it was necessary to first dive and build up speed, since hauling back on the stick in level flight produced only a beautiful snap roll—a feat I have seen other symmetrical jobs do and most disconcerting (not to say decimating!) when shooting a spot landing and attempting to flare out a little. The real fly in the ointment was that sometimes under these conditions, instead of rolling, the job would whip into a true flat spin from which only quick action and down elevator could rescue it. Very light symmetrical jobs are much more tractable, though of course faster and less predictable than a similar lifting wing plane.

A notable contribution to the art has been provided by L. D. Crisp, who outside loops a conventional type cabin ship with an UNDERCAMBERED wing section. In addition he does feats of inverted flying (actually a lot more difficult from a piloting standpoint) that give further credence to a theory I have often hopefully considered—that a lifting wing section ship can be made to do the outside loops and inverted flying nearly as well as a symmetrical section and fly upright a lot better.

Considering the successful and unsuccessful advanced flying I have tried and observed I would say that the following conditions are necessary in such a super-stunt lifting wing design:

1. Low wing loading. 16 ounces per sq. ft. or less.
2. Generous power loading. A big engine never does any harm when stunting and is invaluable in regaining lost altitude and doing loops consecutively without losing headway and faltering around the sky.
3. Large movable elevator travel and area. 40% of total stab area in the control surface. An R/C with inadequate elevator area will tuck under into an inverted dive when attempting outsides.
4. Low dihedral angle. No more than 3 degrees. Considering the emphasis that has been placed on high dihedral angles it is surprising how little the preformance of a stable design is affected by lowering the dihedral. The inversion and looping qualities are always greatly improved, with no rolling out at unexpected moments. However to do an Immelman with a low dihedral ship it is necessary to apply rudder as it goes over the top to get it to roll out. Most designs with 6 degrees or more dihedral will roll out automatically upon neutralising the elevator.
5. Short moment arm. As in U-control, this will aid stuntability.
6. Medium thick wing section, thin stab section.

From the standpoint of the flier the spectacular outside loop is accomplished more in the qualities of the airplane than in any particular piloting skills. When full

*Pictures on opposite page show, top, Jack Williams of Ottumwa with his "Nobair" McNabb 465 mc radio giving pulse proportional rudder, with motor control and elevator via relay delay circuits. Torpedo .32 power*

*Bottom, shows equipment made from surplus gear by John Hamblem of Washington, D.C. Operates on Technicians Band licence at 220 mc. and so helps the flying line situation*

*Right, Howard Bonner with his "Bonner Bug" which is similar to the well-known "Rudder Bug". It is Fox 35 powered, has rudder, motor, and elevator control via a three channel reed receiver (E.D. Reeds), operating Bonner escapements. Also features a steerable tailwheel*

down is sent the plane will either do it or not, and technique on the stick can't play a leading part. Much the same thing can be said of inside looping.

Where the ability of the pilot can really shine is in the entry, performance and transition phases of inverted flight and to do it right is very difficult. First requirement is either a trimmable elevator that can be positioned or one that is not so powerful as to give outside looping qualities. The ordinary ship when inverted, if not trimmed or elevated down (remember that controls are reversed) will refuse to fly level and instead do an inverted dive, "climbing" with the help of gravity. Proper application of down will bring it to level flight angle or even make it gain altitude—actually you are diving it away from the ground. Ships capable of outside looping will climb out into a right side up position with a half outside loop if full down is given when inverted and some cut-ups have accomplished full outside loops beginning and ending in inverted flight.

Symmetrical ships can enter inverted flight with just about as much ease in a half outside loop as they can in a half inside loop. Most fliers prefer to use a half inside loop, but L. D. Crisp favours doing it by way of an outside and feels the extra speed gained is an aid in staying upside down. Rolling as an entry manoeuvre is not successful and would undoubtedly require ailerons to be so.

Inversion is best done against the wind so the pattern is started down wind with a half inside loop. Before the airplane has completed the full half, about three-quarters of the way around, begin applying down trim or down elevator to bring it smoothly into level flight. To keep it there requires constant attention—if one wing is allowed to drop too much even a ship with low dihedral will roll out. Here is another argument in favour of positionable or trimmable down elevator—it leaves the rudder control open for operation. If your radio is such that tone or signal must be held on to keep the elevator in down, then the ship must be most precisely adjusted to eliminate any tendency to deviate from a straight path.

It should not be assumed that the manoeuvre is near impossible, however, for at the Nationals L. D. Crisp pulled a trick out of his hat which looked almost unbelievable. With the airplane (undercambered wing section) in inverted position he glided for a considerable interval in gentle circles; proving the fairly delicate degrees of control can be accomplished upside down.

Recovery is most easily managed in another half inside loop. Some fliers prefer to roll out into level flight, using the rudder, and consider this a better looking and smoother return action. Symmetrical wingers are capable of doing the transition via half an outside loop.

Rolls are not often seen at acrobatic sessions. Some hot rudder only airplanes will do the stunt but only with the usual frantic gyrations as an entry. Several fliers have even made a speciality of this trick, at least one that I have seen does three consecutive. Main requirements are plenty of power and low wing loading. Speed is gained in the usual way by spiralling and as the ship zooms, full opposite rudder is applied. Considerable rudder action is needed, with consequent difficulty in making normal turns, taking a real "blip" artist.

Airplanes with elevator control can be rolled most easily if rudder and elevator can be applied simultaneously. A short dive, then full rudder applied along with up elevator will generally do the trick, though usually only a single roll will result. Consecutive and really presentable rolls with straight entry and exit are only to be performed with ailerons.

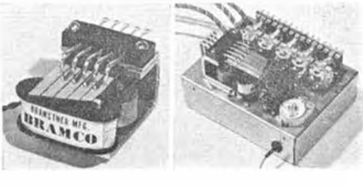
One detail of stunt flying which can be considerably improved upon is the recovery from acrobatics into smooth, straight flight. Rare indeed is the flier who can recover precisely from a long power dive or consecutive loops without a certain amount of jumping and zooming. Practice alone will develop the proper technique on the stick and give you that automatic reaction which Alex Schneider and a very few others possess.

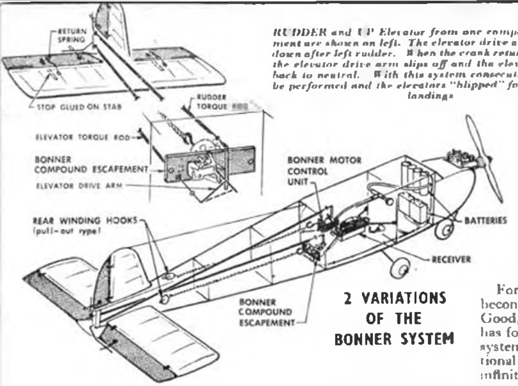
However much you fly radio control and develop skill, much of the advanced work will only be gained with a multiple control airplane and equipment. The five-channel outfit, with reed or filter controlled audio tones has been the standard for multi-control. Three channel radios are popular, generally seen with one tone for compound escapement rudder and motor control; the other two being for up and down servo action. Fast coming up is the 6-reed set, particularly a version made by Bramco. This allows the usual Right, Left, Up and Down on four channels with the final two hooked up for trimmable motor control.

That six is not the final number of channels for the ultimate audio tone set might have been the conclusion of anyone who visited Mile Square airport, the R/C test flying site, some 10 miles from Los Alamitos NAS during the Nationals. There Bob Beckman and Bob Leininger were testing and breaking in their big new 7½ ft. Cub-type jobs equipped with seven reed radios. This provided enough channels for fully controllable ailerons. The realistic flight these made possible gave the observer cause to realise how lacking in precision is a rudder controlled craft. It seems certain that more will be heard from these ships when they are fully tuned up.

Contemplation of the cost of super multiple tone sets is enough to put a sinking feeling in the region of a model builder's pocketbook, not to mention the havoc wrought in a small apartment by a monster nearly large enough to require a hanger. So no matter how much the elaborate layouts may set the pace they are far outnumbered by smaller and more economical multi-control combinations.

*New Bramco Gold-Chip receiver. Five channels with gold relay contacts and reed contactors. Gold gives 200 per cent. better pressure contact than silver with less oxidisation. Reed unit is shown on left*






*RUDDER and UP Elevator from one compound escapement are shown on left. The elevator drive arm is pushed down after left rudder. When the crank returns to neutral the elevator drive arm slips off and the elevators spring back to neutral. With this system consecutive loops can be performed and the elevators "blipped" for three-point landings*

*A single channel Bonner set-up giving RUDDER, MOTOR, ELEVATOR control. When elevator is held the engine is always running at fast speed permitting spectacular precision stunting. The Bonner Compound Escapement is a 4-position, speed regulated, self-neutralising device which permits selective rudder position and an auxiliary control, yet permits an automatic return to neutral upon absence of a signal*

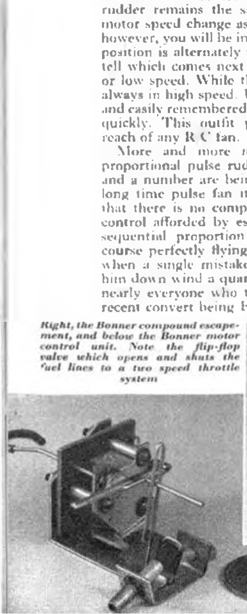
## 2 VARIATIONS OF THE BONNER SYSTEM

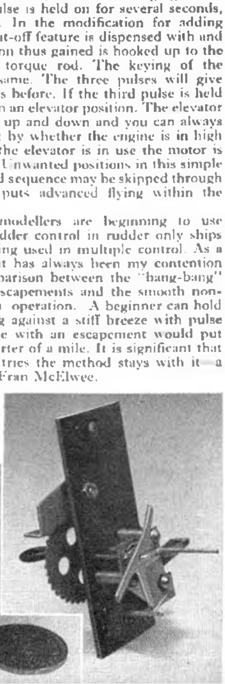
Many builders have dreamed up their own simplified gadgets for extra control, including the author, but from a standpoint of popularity the undisputed winner is probably Howard Bonner's R-M-E system using his well-known rudder escapement and secondary control. It is most often seen in a Trixter Beam with a .15 cu. in. engine, making a light and compact ship that can perform an astonishing variety of stunts with any ordinary single channel radio.

Usually the secondary escapement is hooked up for motor speed and control shutoff. The keying code is one pulse for right, two for left, three for changing motor speed. If the third pulse is held on for several seconds, motor cut-off occurs. In the modification for adding elevator control the cut-off feature is dispensed with and the escapement position thus gained is hooked up to the elevator via another torque rod. The keying of the rudder remains the same. The three pulses will give motor speed change as before. If the third pulse is held however, you will be in an elevator position. The elevator position is alternately up and down and you can always tell which comes next by whether the engine is in high or low speed. While the elevator is in use the motor is always in high speed. Unwanted positions in this simple and easily remembered sequence may be skipped through quickly. This outfit puts advanced flying within the reach of any R/C fan.

More and more modellers are beginning to use proportional pulse rudder control in rudder only ships and a number are being used in multiple control. As a long time pulse fan it has always been my contention that there is no comparison between the "bang-bang" control afforded by escapements and the smooth non-sequential proportion operation. A beginner can hold course perfectly flying against a stiff breeze with pulse when a single mistake with an escapement would put him down wind a quarter of a mile. It is significant that nearly everyone who tries the method stays with it—a recent convert being Fran McElwee.

*Right, the Bonner compound escapement, and below the Bonner motor control unit. Note the flip-flop valve which opens and shuts the fuel lines to a two speed throttle system*





For future development proportional is certain to become the standard system for advanced flying. Walt Good, working with his usual care and thoroughness, has for several years been perfecting a dual proportional system of control. This permits simultaneous proportional operation of both rudder and elevator, allowing an infinite variety and combination of surface position and consequent exactitude of control over the airplane.

The receiver is a five tube affair consisting of one super-regenerative stage, one audio stage and three relay tubes and requires no reeds or tuned filters. The transmitter has seven tubes; two 2-tube electronic pulsers, two for the multivibrator tone generator and one 3A5 for the RF stage.

The rudder is operated from two tones; 100 cps for left and 500 cps for right. The average positive pulse width gives up and the average negative width gives down. In the receiver the tone discriminator section (rudder) is not responsive to the pulse width and the pulse width discriminator (elevator) does not react to the change in tone frequency. Thus the rudder and elevator can be pulsed simultaneously as well as independently.

The motor control of this system is also arranged as a fail safe device. The stage stays cut-off as long as some tone is present. Sending no signal (also loss of control) or non-modulated carrier keys the motor control and/or cut-off and at the same time opens the elevator and rudder actuator circuits, which neutralises them. The actuators incidentally, are simply British made Mighty Midget electric motors, used with the built in gearing just as they come from the box with very little additional work needed.

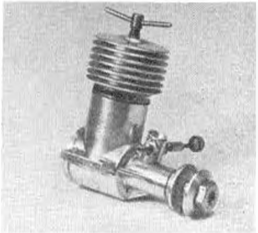
For such perfected control the outfit works out very reasonably—the complete airborne gear runs between 20 and 26 ounces depending on whether it is the 45 volt sub-miniature version or the 67½ volt standard tube set. A DC RC associate, Al Diem, has turned out a sub-sub-miniature receiver layout weighing only 10 ounces and installed in a half A job!

A number of fliers in and out of Walt's club are now flying the system and the author, among many others, has it scheduled for his next RC. Installed in Walt's original Rudder Bug, some very impressive flying has been done, including pacing a much faster ship flown by Harold DeBolt in a closed course race due to the ability to cut a close pylon corner. If a prediction may be ventured, this is the control to watch.

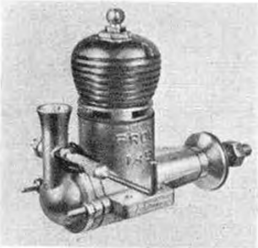
Walt has further intriguing material in the works in the form of a modern version of the Rudder Bug, called Multi-Bug. Wing span is 6 feet and a 4412 wing section with a flat bottom is used. Finished flying weight target is 5 pounds.

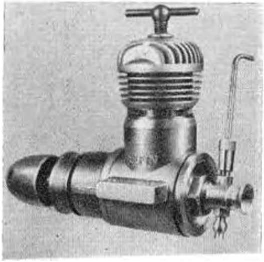
With so many interesting possibilities to look forward to it is not likely that the sport is in any danger of growinge stale. Even the long flying line situation should improve with the use of more frequencies. The new Technicians Band with only 5 wpm code requirement and 50-54 and 200-220 mc. privileges is attracting many applicants. Already several groups have reported flying six planes at the same time. The day of formation flying, closed course racing and dogfights will soon be at hand.

At left, first Argentinian motors are produced by Jose Columbi from Mendoza. 2.5 c.c. and 6 c.c. glowplug. At right is Hungarian 2.5 c.c. Daru with fantastic 12.5 mm. stroke, 16 mm. bore. Will be tested for a report in future issue



# MOTOR MART





SEVERAL BRITISH MANUFACTURERS have been approached with a view to making a *very* popular American-designed engine, primarily for the American market. An interesting—and flattering—appraisal of British manufacturing technique—or is it the labour costs that count?

After a long run, the Frog "500" spark ignition version has been withdrawn from production. The standard "500" glow, of course, continues.

Frog's have a new engine in the "under 1 c.c." class coming along which, in all probability, should be ready for the market by about September. The spring brass circlip currently used on the Frog 249 to hold the rubber oil seal in place on the front bearing housing is to be replaced by a Terry spring circlip, as these become available.

A glowplug version of the Frog "149" has now gone into production. Only visible difference is the new head, but the actual "conversion" has involved far more than this. Considerable development work was necessary before performance as a glow engine was considered satisfactory, mainly reflected in the shape of the combustion chamber, and selection of the "optimum" compression ratio. A particular feature of the "149" glow is that it will perform satisfactorily on straight glow fuels although for best performance a minimum of 10 per cent. nitromethane appears advisable.

A report on the performance of this new engine will be included in an early issue.

*New British Products, and each an advance in design and performance. Top: Glow version of the "Vibramatic" Induction Frog 149 which is extremely easy to start. Centre: The latest Dennis Allen motor is the "10", a green head 1 c.c. diesel, sturdily built and which will establish a new standard in output for capacity. Bottom: The rebuilt Elfin 2.49 B.R. with screw-in barrel, revised porting and clack valve induction*

The A-M "10"—just out—has surprised everyone, including, we suspect, Allen-Mercury, by developing as much power as many of the current one-and-a-half's. F.A.I. power fans will better appreciate the potential performance of the new A-M "10" in terms of model size. Lost o.o.s. on an initial test flight (who didn't use an effective d/t?), a new Mercury free flight power design prototype showed a vertical climb on the "10", not in itself surprising until it is realised that the model size was about the same as that previously common with 2.5 c.c. motors. Brief specifications: span 53 in., wing area 350 sq. in.; tailplane area 150 sq. in.; total weight 14½ ounces. Quite a big model to get V.T.O. with a 1 c.c. power plant!

Here's a typical problem which crops up from time to time in engine testing. The figures quoted are quite independent of our own engine tests. They were actually obtained by a manufacturer comparing one of his prototypes against a rival standard. On *plastic* propellers the prototype engine "A" definitely had the edge over engine "B"—

| | Engine "A" | Engine "B" |
|---|---|---|
| 8 x 8 | 6,400 | 6,100 |
| 8 x 4 | 8,000 | 7,400 |
| 7 x 5 | 9,000 | 8,500 |
| 6 x 4 | 14,900 | 13,200 |
| 5 x 4 | 17,600 | 14,800 |

No doubt about it. Engine "A" better every time. Now compare the results using wooden propellers

| | Engine "A" | Engine "B" |
|---|---|---|
| 8 x 4 | 8,600 | 9,000 |
| 7 x 4 | 11,000 | 11,000 |
| 6 x 4 | 13,400 | 13,600 |

Nothing to choose between the two, now, and they are the same engines as before! Lack of flywheel action with the lighter wooden propellers making all the difference? Not at all. To check this the wooden prop. tests were repeated with a small flywheel added and identical figures obtained!

AIRCRAFT DESCRIBED

Number 79

*With pilot's escape rail and revised cowling air outlet, the camouflaged prototype of this admirable subject for twin-engined free-flight or control-line scale is seen on a test flight. Drawing opposite shows cowling outlet as on the Paris Aero Show display version*

# FOKKER D.23

IN THE ARMAMENT race that preceded World War II the aviation industry produced a number of unique prototypes on both sides of the Atlantic, but few were as attractive for model making as Antony Fokker's D-23.

It had a parallel in the Lockheed P-38 Lightning and it is said that the D-23 was built in competition for the much valued U.S. Army contract. Unfortunately the Luftwaffe attack on Schiphol Airport in 1940 put an end to this, and although plans had been made for production in the Netherlands, only one aircraft was actually built and flown.

With its tricycle undercarriage, novel application of twin engines in a centre nacelle, heavy armament and cockpit armour plate, it was a most promising and modern conception. The designed top speed was some 10 m.p.h. higher than that of the Messerschmit M.E. 109, and the welded steel tube fuselage was adaptable to take a variety of engines in the then popular inverted Vee 12 air or liquid cooled form.

Delayed arrival of the Bohemian Walter Sagitta-ISR 540 h.p. engines held back the first test flights for some time. Finally Mr. Leegstra, the chief test pilot, made a successful series of proving flights during which the absolute ceiling was found to be more than 30,000 ft., range 560 miles and maximum speed 326 m.p.h.

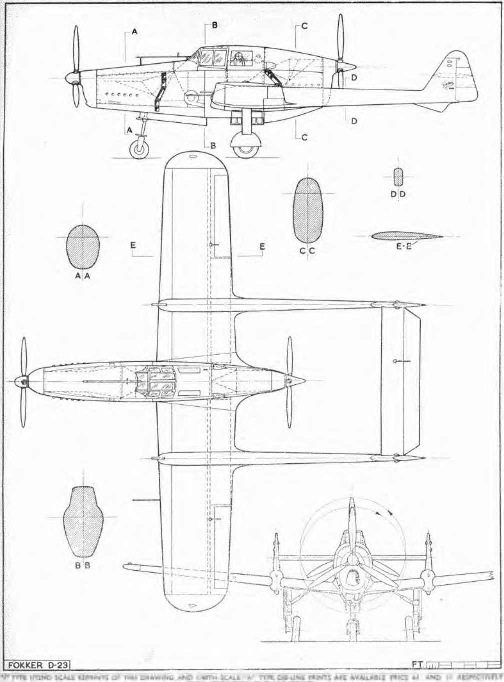
By having the two engines in tandem, torque was eliminated without having to resort to special gear boxes for reversing the direction of one engine as on other types, and the alternative power of Isotta-Fraschini Delta 750 h.p. engines were expected to raise the maximum speed to 342 m.p.h., though we have no confirmation that they were actually fitted.

Although the tandem layout had many design advantages it brought with it fueling difficulties in the rear engine, vibration problems on the rear propeller and, more serious, the problem of pilot escape without injury. Had the Fokker establishment remained active in the early war years, and the D-23 gone into production, doubtless Antony Fokker would have created the first ejector seat, for there was every reason to fit one on the D-23. Cooling and vibration problems were solved, but the emergency procedure for baling out was never an attractive proposition for the test pilot, although luckily, the occasion never rose. In case of emergency the rear engine had to be stopped, and the aircraft held steady as possible until the propeller was at rest. Cockpit hood was jettisoned and the pilot left on the starboard side climbing downwards hand over hand on a permanently fixed rail, until underneath the wing and free to drop clear of the tailplane.

Two syncronised Browning 7.9 mm. machine guns were positioned in the fuselage, firing through the forward airscrew disc, and two Browning 13.2 mm. shell firing guns mounted in the forward part of each tailboom. Alternatively a pair of 20 or 23 mm. cannon could be fitted in these wing positions. With such armament and prospect of improved power units after development of the prototype, there is no doubt that the D-23 would have become a most useful ground attack and air fighting weapon in the Netherlands Air Force. The prototype did not bear national insignia, but carried the letters X-4 in white on the tailbooms and wings, all upper surfaces have camouflage in apple green, olive green and khaki, with light blue/grey undersides. In one photograph the D-23 appears to have been painted black on the under surfaces, but this cannot be confirmed.

**Technical Data.**—Span 37 ft. 9 in. Wing area 199 sq. ft. Length 33 ft. 3 in. Weight empty (Saggita engines) 5,060 lbs. Weight loaded 7,590 lbs. Wing loading 33.2 lbs./sq. ft. Power loading 6.16 lbs./h.p.

**Performance** (Saggita engines).—Maximum speed 326 m.p.h. Cruising speed 242 m.p.h. Service Ceiling 29,520 ft. Ceiling on one engine 18,040 ft. Range 560 miles.


A
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FOKKER D-23
FT.

# AEROMODELLER RADIO CONTROL TROPHY

CRANFIEL
APRIL

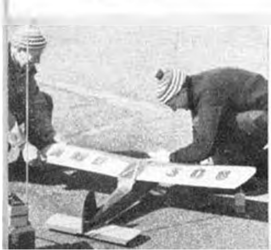
OPENING CONTEST for the button-pushing brigade, this event was also an eliminator for the International Radio Contest to be held in Belgium on June 15th-18th. Attendance was good and encouragingly lacked the spate of radio trouble that seemed to beset the 1955 contest season. Encouraging too were the calm and sunny weather conditions which persisted throughout the day of the contest. J. Fox of Hatfield proved that a well practised rudder-only flier can beat the multi/channel performers, even in this two-part event which combines course flying with a stunt schedule. Leaving aside the inept handicap system which adds a 50 per cent. bonus to final scores for single channel systems, Fox established a clear lead over his nearest rival, his aptitude for spot-on spot landings being a predominant feature of a first class flying performance. Model was unusual, but practical, in omitting an undercarriage and carried its batteries strapped to the underside of the fuselage. R. Higham of Diss was the most impressive performer amongst the multis. He used E.D. 6-reed equipment in a Senior Live Wire and showed good piloting skill, but was not sufficiently well versed in the contest schedule, suffering like many others from trying to remember what to do as well as doing it, all at the same time!

Other good performers were Howard Boys, waggling the rudder of one of his vintage machines, and D. Fisher a Country Member who was a tower of strength in helping many other competitors during the run of the contest. J. Webster, another multi performer whose reed equipment we described in the December, 1955, "AEROMODELLER", was reliable but hesitant and R. Cooke of West Essex, resplendent in Davy Crockett hat (first of many to come no doubt), placed well but terminated his flight unwillingly at the spin section of the stunt schedule, thus providing the best prang of the day! Perhaps not the very best—this being performed by Ted Hemsley after the contest when he came out of inverted flight about 15 feet under the tarmac!

| | | | Points | | Handicap Pts |
|---|---|---|---|---|---|
| 1. | J. Fox | Hatfield | 386 | S | 579 |
| 2. | G. Parkinson | C.M. | 305 | S | 457.5 |
| 3. | H. Boys | Northampton | 292 | S | 438 |
| 4. | D. Fisher | C.M. | 262 | S | 393 |
| 5. | R. Cooke | W. Essex | 253 | S | 379.5 |
| 6. | R. Higham | C.M. | 360 | M | 260 |
| 7. | J. Webster | C.M. | 316 | M | 316 |
| 8. | O. E. Hemsley | B. Park | 270 | M | 270 |
| 9. | N. Warby | C.M. | 131 | S | 196.5 |
| 10. | A. McDonald | W. Essex | 156 | M | 156 |

*Heading above attendant crowd with Vic Dreese's multi taking off. Top, left, E. Ardron holds fin and transmitter button for R.O.G take off, this was maiden flight of new model. Above rear view of modeller Higham, front view of his Senior Live Wire with reed control and De Long 30 up front*

*Above, Country Member G. Parkinson with well-worn R-6B E.D. 3.46 c.c. powered. Right, J. Webster releases his 6 reed (own design) "Radio Queen" whilst film camera records incident. Lower right, D. Burgess of the Flying Druids flew single channel Electra but had trouble. Below, George Redlich with well-worn veteran model used his usual 6 reed control system with Miles Special up front. Left, G. McDonald steadies tip whilst N. Allen starts up Both are members of West Esse xand wing tip numbers emphasise that Mac hails from H.J.N.'s in Holloway Road*




# CLUB NEWS

WHAT HAPPENED on March 25th? It was traditional Gamage and Pilcher day, with mad March winds a'blowing at 15 m.p.h. plus in most parts: but otherwise it was a beautifully sunny day, with plenty of thermals waiting to be hooked. Yet the entry for these two events was no less than 50 per cent. of previous years! Only *half* mind you—148 in the Pilcher against a normal 270 to 320 competitors. Makes one think that competitive aeromodelling is on the wane . . . I hope I'm proved wrong when the Eliminator results come through: anyway sincere congratulations to Roberts of Five Towns for carrying off the Pilcher this year—he placed third in '55 with practically the same duration. And commiseration for Dave Painter who missed the trophy by 25 secs. with his well-worn *Pelican*. Fine show, too, by Bradford's Pop Miller in showing the youngsters the way home in the Gamage.

## London

Slope soaring interest is on the increase and latest announcement of an organised meeting is that by the **EPSOM D.M.F.C.** To be held on Surrey's picturesque Box Hill, on July 29th, the main contest event will be outright duration (Albatros Trophy) with a special cup for best Junior and another award for longest controlled flight of the day. Anyone for 7½ hours? For particulars write: W. Tinker, Dean Lane Park, Merstham, Surrey.

**HAYES M.A.C.** is somewhat bucked that member Pete Robson—and Junior at that—should top the London Area figures for the second A/2 Eliminator with an A.P.S. *Shorty* flying for 13:26. J. Baguley of the same club was second with exactly 12 minutes, and both should be well up in the National results. Control line activity has extended to combat, but the first Sunday workout did not produce a single cut!

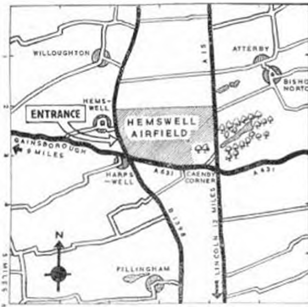
## For your Diary—

**Events inviting your entry**

**June 3rd**
Dartford C/L Rally—Dartford Central Park—all classes.
**June 17th**
Chester Slop Soaring—Clwyd—5 glider classes inc: R/C.
**June 24th**
Midland Area Rally—R.A.F. Wellesbourne—f/f, T/R, Combat.
West Hants Rally—R.A.F. Andover—f/f, R/C, Glider, T/R.
**July 8th**
Stockport Express Rally—Woodford—f/f, T/R, Combat, Scale.
Northern Heights Gala—R.A.F. Halton—f/f, Combat.
**July 15th**
Enfield C/L Rally—Enfield playing fields—all classes.
Croydon Gala—Chobham Common—f/f.
**July 29th**
Epsom Slope Soaring Rally—Box Hill, Surrey.
**August 5th**
I.R.C.M.S. R/C—R.A.F. Wellesbourne—Nr. Stratford-on-Avon.
**August 12th**
Cambridge C/L Rally—Pye Sports Field—T/R, Combat.
**August 26th**
S. Midland Area Rally—Cranfield—f/f, T/R, R/C, Combat.
**August 25/26th**
PAA Scottish Festival—RNAS Abbotsinch—f/f, PAA, T/R.
**September 16th**
All-Britain Rally—Radlett.

## The Nationals

***This map shows the immediate vicinity of R.A.F. Station Hemswell, which is easily located on any road map by the intersection of roads A.15 and A.631 at Caenby Corner. Be sure to find the right aerodrome, as there are eight others within a ten mile radius of Hemswell! Should the wind be Westerly, a wooded estate with large lake may be the claimant of the flyaways. Events are as below:***




**May 20th**
THURSTON CUP: Glider.
DAVIES TROPHY: Team Race "A"
SHORT CUP: 2.5 c.c. PAA load.
GOLD TROPHY: C/L Stunt.
SMAE TROPHY: R/C.

**May 21st**
SIR JOHN SHELLEY CUP: Power
MODEL AIRCRAFT TROPHY: Rubber
DAVIES TROPHY: Team Race "B"
BOWDEN TROPHY: Precision Power
SUPER SCALE TROPHY: Scale f/f
TAPLIN TROPHY: R/C
LADY SHELLEY CUP: Tailless

Thirteen (a nice lucky number) flew in the **NORTHWICK PARK M.A.C.** Easter Scramble—actually held on April 15th and the winner was Dave Leech flying a tiny chuck glider for 14:37 out of an hour. One minute maxes were imposed for the small field and the boys tell me that Scrambling is just the thing to brighten up a week-end.

## South Eastern

**BRIGHTON D.M.A.C.** ran their annual Mullett Cup along with the Pilcher, but the strong coastal wind tempered durations somewhat, along with bags of turbulence. Reg Boxall placed first with 6:21 and brother Fred was 2nd. Reg and Fred also had their annual bash at the Gamage, Reg being 13th (mmm!) in the final results. Just to be repititious, Fred and Reg (that order this time) took in the A/2 Elims and Fred scored 12:31, which should certainly guarantee his spot in the Trials.

Along the coast at **EASTBOURNE** the club exhibition was a great success, and here's a wrinkle from scale expert H. J. Towner. Try the new cellulose water soluble wallpaper pastes for a base to colour dope—you've never seen such a gloss! A small party of stalwarts will go to Hemswell, but like most other clubs, I fear the change to a Midland venue will have discouraged many who would otherwise have gone to Waterbeach. What a pity it is that the average Englishman isn't used to travelling, or is the cost of living that it cripples the will to go far?

The South Eastern Area Rally will be held at Ashdown Forest on September 23rd, including all free-flight events and a novelty contest.

One aspect of the travel question is well illustrated by the **SOUTHERN CROSS A.C.** Newsheet which announces that charges per seat in a hired coach Brighton to Hemswell would be £3 for Seniors and £2 10s. for Juniors, with a return time of 3 a.m. at Brighton on the Tuesday early morning. I hope they make it, the Tailless Shelley wouldn't be the same without those 21-ft. gliders.

## Southern

**SOUTHAMPTON M.A.C.** had a fine turn-out at the Gamage and Pilcher, and from the Elims for A/2 they hope that P. Giggle will find a place in the Trials. Club total of 18:35 in the team rubber Farrow Shield on 11 flights may not sound so much, but not to worry lads, there'll be several clubs behind you.

Across the water in the Isle of Wight, **SOLENT HEIGHTS M.F.C.** had a battle with the **GODALMING** boys on Easter Sunday, choosing Thorney Island as a mid-way venue. K. Boughey of Godalming lost his job out to sea, and S. Heights emerged as winners. The **WEST HANTS A.A.** have sportingly given way to London's Northern Heights on their rally date. Now fixed at R.A.F. Station Halton, the annual N.H. Gala will be on July 8th, and thanks to close co-operation with Officer Commanding R.A.F. Andover, the West Hants A.A. have now booked their rally for June 24th so as not to clash—in spite of being "first" on the calendar.

## Western

Renewed interest is sending **BRISTOL ACES M.A.C.** from strength to strength with outdoor C/L flying every Sunday at R.A.F. Filton. In the summer they may be running a control-line rally in conjunction with **SOUTH BRISTOL M.A.C.** to be held at Lulsgate. Team racing and combat will be featured . . . for cash prizes. There'll be a challenge match between Southern and Western Areas in June, at Swindon and a Gala day at Keevil (Trowbridge) on July 1st for all events (wish they'd tell me whether it's 'open' so I can put it in the Calendar!). Similarly, that goes for a C/L rally at Lulsgate on August 12th, where the carrier H.M.S. *Cheltenham* will be present for action, and a couple of F/F events thrown in for good measure. Or is this the same rally as the Bristol lads announce ? ? ?

## South Western

A write-up in the *Western Evening Herald* boosted membership of the newly-formed **PLYMSTOCK AND D.M.C.** which is open to all types of modellers and has a keen boat section as well as an active aeromodelling secretary. One unique membership stipulation is that within a month of joining each member should be in the possession of a model. Since the Hon. Sec. is in the Constabulary we bet there's no fiddling that one!

## South Midland

What a blow-out the Area Slope meeting turned out to be on Easter Sunday at Ivinghoe Beacon. The wind could not have been in a less favourable direction, nor more forceful. Some fifty models turned out, but flights were over the ridge and away for a fast 600-ft. descent on t'other side. Pity, because the next day was absolute perfection. Why are Mondays always such fine flying days? The Area came to the S.M.A.E.'s rescue in finding Cranfield suitable and available for the April 15th R/C meeting at short notice, and almost local man, Joe Fox of Hatfield, won the AEROMODELLER R/C Trophy as reported on page 257.

## East Anglian

High winds have been grounding the **NORWICH M.A.C.** enthusiasts, but L. Brock has been using his A.P.S. *Y-Bar* to good purpose in winning the club "all-in".

From **CAMBRIDGE M.A.C.** the newsheet tells us that Clive King of Waterbeach has put more than a hundred hours in his A.P.S. *Hannibal*—complete to the last window curtain. New cheap fuel formulae are to be announced by the club Newsheet next month.

## Midland

**COVENTRY AND D.M.A.C.** have completed a highly successful indoor programme and the record for Microfilmies is now 51 mins. by R. Draper. The **BIRMINGHAM** experts, Monks, Read and Poole, paid them a visit and passed on many useful tips. The **LEICESTER** lads have been busy with their A.P.S. *Mam'selles* to judge by the club warning note not to abuse the trim tab!

**HEANOR AND D.M.A.C.** did well at local handicrafts exhibitions, mainly through Maurice Booth's *Halifax* which the club is trying to talk him into flying! I'd like to see this model at one of this year's rallies, having heard so much about it.

## East Midland

**FORESTERS** were due to entertain the Heanor lads at Nottingham last month, and among their own activities they list a two-hour film show of the U.S.A. Nats, etc., sent to Geoff Pike. Three members are going to the Criterium d'Europe C/L Championships at Brussels, and I'll never forgive 'em if they let the old Oliver home down.

## Northern

Political intrigues are fascinating. I wonder what the Area P.R.O. is after with the twaddle he has written in the Newsheet. The pity is that some will believe him when he says the model press caters almost exclusively for the sport flier and non-contest types. You'd better flip through the back numbers and start counting up the pages, old man . . .

**CHESTERFIELD SKYLINERS** went to **DONCASTER** and had so many models airborne including Mr. Stretton's enlarged *Pulqui* with a 2.46, that the locals thought there was a contest on. Club has decided to run a monthly coach trip to other flying fields in the area, and this was the first of them.

**LEEDS AND BRADFORD** are contest active, Leeds totalling 29:13 in the Farrow in spite of strong winds and O.O.S. at 2:30—conditions which were pretty general around the country on that day. From **HALIFAX** Silvio L. has been doing a fatherly act and encouraging the newly-formed **BOLTON BROW BOYS M.F.C.** with a film show or three. Club is a school group, and a measure of activity is that forty *Skyhop* gliders have been made. Allan Nobbs-style fuselages are favourite in Halifax (*see* page 260) and a flush of 190 sq. in. lightweight rubber jobs are coming along.

### S.M.A.E. CONTEST RESULTS

**Pilcher Cup (Glider)**

| 148 *Entries* | | *25th March* |
|---|---|---|
| 1. G. Roberts | Five Towns | 10:50 |
| 2. D. Painter | Henley | 10:2[illegible] |
| 3. J. Harris | Loughborough College | 9:57 |
| 4. R. Goodall | Surbiton | 9:36 |
| 5. N. Willis | Anglia | 9:33 |
| 6. J. Kay | Loughborough College | 8:54 |

**Gamage Cup (Rubber)**

| 74 *Entries* | | *25th March* |
|---|---|---|
| 1. C. P. Miller | Bradford | 11:05 |
| 2. J. K. Cartwright | Hull Pegasus | 10:53 |
| 3. T. Chambers | Stockton | 10:20 |
| 4. I. Wilkie | Wigan | 10:20 |
| 5. H. Burwood | Blackheath | 10:10 |
| 6 E. Barnacle | Leamington | [illegible] |

## North Western

Eileen Whiston gained a second place at the Northern Models Exhibition with her P.26A for **URMSTON AND D.M.A.C.** just to show how good the ladies can be when they try their hand at the hobby. At **BLACKBURN** the lads are striving to get back into full swing with a boom for controline. In 1951 average attendance was 60. Membership today is 17. A similar come-back is being staged on Merseyside, where an Association of Merseyside Clubs has been formed to co-operate on coach hire, etc. **CROSBY, WAVERTREE, MERSEYSIDE, HUYTON AND WALLASEY** are in it, and what about the new ones at **SOUTHPORT** who are largely Juniors and due to become affiliated to the S.M.A.E., plus the **LIVERPOOL A.C.** with largely solid modelling interest? New members for the latter would be welcome at Lundy Hall, Kensington, any alternate Tuesday, beginning May 9th. John Done's Mills .75 1957 F.A.I. ruler is turning in over 2 min. on 15 sec.—there's food for thought from Wallasey!

No, **WHITEFIELD,** I can't leave you out so you are last but not least! J. O'D. is again top of the list for club performance in recent National contests, and he's in the A/2 Trials, along with A. Wrigley and J. Trainor, so we shall see him thermal hunting with his novel glider yet again—and I bet he hooks at least three bumps at the trials!

Anyone rabidly keen on flying scale? Want an American pen-pal? Then write to D. Greenfield, 4003 50th Street, Seattle, Zone 16, Washington, U.S.A.

Just look at that list of clubs!

THE CLUBMAN

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Sowerby Bridge Boys Secondary School, Sowerby Bridge, Yorkshire.

BOREHAM WOOD M.A.C.
11 Delamere Road, Boreham Wood, Herts.

BRAMHALL M.A.C.
V. Brettel, "Chipstead", Bramley Road, Bramhall, Ches.

HYMERS COLLEGE (Hull) M.A.S.
M. R. Abbott, 60 South Street, Cottingham, Yorks.

IPSWICH M.A.C.
R. Lindridge, 11 Daffodil Close, Chantry Estate, Ipswich.

LIMERICK M.A.C.
M. Fenton, "Hillview", Dooradoyle, Mungret, Co. Limerick.

MERSEYSIDE M.A.C.
R. Thomson, 62a Ashbourne Road, Aigburth, Liverpool 17.

MID SOMERSET M.A.C.
F. B. Turner, 39 Hound Wood Drive, Street, Som.

PLYMSTOCK AND D.M.C.
B. F. Langridge, 27 Pomphlett Close, Pomphlett, Plymstock, Plymouth.

PRENTON M.A.C.
R. Carruthers, 24 Walker Street, Nr. Tranmere, Birkenhead, Ches.

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C. King, Red Roofs, Ely Road, Waterbeach, Cambs.

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P. Hollindale, "Castramon", Stoney Lane, Burton, Christchurch, Hants.

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M. R. Downes, 78 Norwich Road, Dereham, Norfolk.

DUNMOW M.F.C.
A. W. Gunn, 17 Oakroyd Avenue, Dunmow, Essex.

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An easy-to-build 50-inch wingspan cabin model with a contest performance. The Outlaw features sheeted leading edges to both wing and tailplane. This plane will give you all the flying fun you need. Suitable for 1.5 to 2.5 c.c. motors. **27/-**

### SENATOR

A novel rubber powered duration contest model. Simple "box" fuselage, single leg U/C, and multi-spar wing. 32-inch wingspan. **6/9**

### SOARER

This rugged glider design is available in three sizes. Construction is ultra-simple, and performance very good.

| | |
|---|---|
| SOARER BABY, 36-inch span | 4/- |
| SOARER MINOR, 48-inch span | 9/9 |
| SOARER MAJOR 60-inch span | 13/11 |

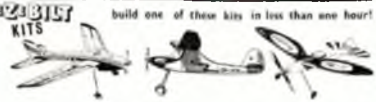
## THERE ARE NOW OVER 100 MODELS IN THE KEILKRAFT RANGE

*And here are a few of the many under 5/- kits*

**DURATION MODELS**

23" Pixie 4/9 · 20" Playboy 4/- · 24" Achilles 4/9 · 16" Elf 3/9

**EEZIBILT KITS** build one of these kits in less than one hour!



16" Rapier 4/3 · 18" Sedan 3/9 · 19" Sportster 3/9

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30" Dolphin 4/9 · 20" Cub 3/- · 30" Cadet 4/9 · 20" Nomad 4/2

*PREFABRICATED CHUCK GLIDERS*

12½" Spook 1/9; 12" Vega 1/6 · 20" Polaris 3/- · 24" Comet 4/2

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THE GREATEST NAME IN MODEL KITS

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