OCTOBER 1956

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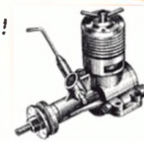

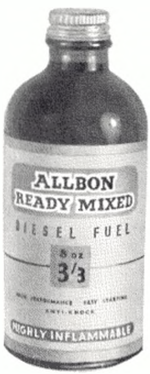

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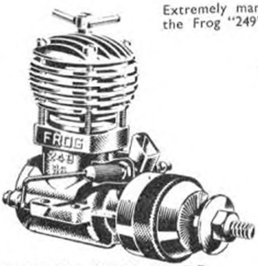

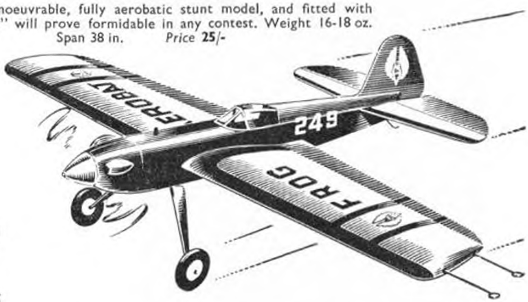

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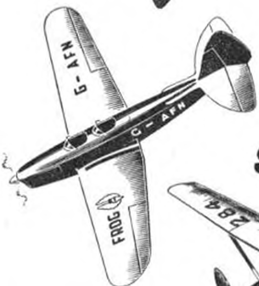

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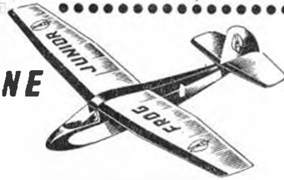

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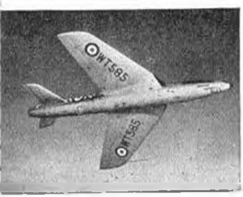

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AERO MODELLER

"Covers the world of Aeromodelling"

VOLUME XXI
NUMBER 249
OCTOBER 1956

Managing Editor - - - - C. S. RUSHBROOKE
Editor - - - - - - H. G. HUNDLEBY
Assistant Editor - - - - R. G. MOULTON

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Special features

★

Regular features

★

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Mighty powerful power flyers!

COUNTLESS THOUSANDS of readers will echo our congratulations to Ron Draper of the Coventry Club for his resounding win at the World Power Championships held at Cranfield. Not only did he compete with the cream of International opposition, but also with the worst Bank Holiday weather this wet island of ours has seen for many a year. Hot on his heels in second place was Dave Posner, who together with Mike Gaster and George Upson, composed a British team that won by a clear margin the Franjo Kluz team trophy, thus establishing the supremacy of British flyers for the second year in succession.

Let us not forget either the efforts, no matter how flamboyant, of that exceptional proxy flyer Silvio Lanfranchi who took third place for Conover of the U.S.A.

Silvio with his Swiss-Bradford accent, which gets worse rather than better as his contest years progress, provided a vein of lighthearted banter throughout the run of the contest which persisted even through those tense moments of the final fly-off.

We trust that the S.M.A.E. when submitting their final proposals to the F.A.I. regarding the International Power and Wakefield rules will study carefully the results lists for both contests. Although conditions at Cranfield were varied in the extreme the weather at the time of the fly-off was almost perfect. Wind drift was negligible and thermal activity almost nil, the clear blue sky being a fair indication of this latter condition. On engine runs averaging 14 seconds the men in the fly-off averaged 4 : 49 for this deciding round, which indicates that with a ten second engine run the figure would not have been far off the desirable three minute mark. Had there been thermals about then this fly-off could well have been decided by the quality of the timekeepers' eyesight as it was in Finthen last year. We gather that the weather at Hoganas was little short of appalling, and it appears that, coupled with the five flight system, it successfully prevented anyone achieving their full quota of maximums. Nevertheless the top three men managed four out of the five maximums in spite of the dreadful conditions.

All of which seems to indicate that slight changes in the rules are desirable if fly-offs are to be avoided. Personally we find they provide an exhilarating finale to any contest and secretly would be sorry to see them go. One thing is certain in this hotly-debated question of F.A.I. rules—that the F.A.I., whatever their final decision, will not please everyone. We only hope that those people who see their opinions discarded as a result of a democratic decision will have the grace to accept without complaint the rules required by the majority. Let us hope too that the F.A.I., when they meet in December, will confirm the new rules for at least four years, as the constant indecision that has prevailed throughout this season has done nothing but harm to competitive modelling.

On the cover . . .

Those old enough to remember the days when aviation was a matter of flying, "by the seat of one's pants", when 200 m.p.h. was considered hardly attainable and when flying really was an adventure, will view this Charles E. Brown portrait of an Avro 504N with nostalgia. Seen with the ailerons clipped and in R.A.F. colours, this trainer is one of the variants drawn in detail by George Cox on page 532 of this issue.

Heard at the HANGAR DOORS

Winners Corner

REFLECTIONS on the just-concluded World Power Championships are the obvious theme for discussion in the group at right of Dave Posner, Ron Draper, Team Manager Pete Buskell and proxy flier Silvio Lanfranchi. Just what Silvio was saying at the time we cannot recall: but one can safely presume that it concerned the very narrowness of his ultimate defeat by the two British lads, for Silvio is not one to let others remain ignorant of his position in the fly-off! Earlier, he had rocked the onlooking crowd by answering an emphatic NO to the request as to whether he was ready to fly. This was followed by an immediate YES; but the effect of the first reply on the organisation was more than obvious, and served to relieve much of the tension associated with a deciding fly-off.

It is interesting to note that while these four prominent modellers were engaged in one discussion group, a larger and more international gathering was centred about Mike Gaster. His was the model that most people wanted to study, and possibly gained greatest respect for its performance in the contest.

Doug Gordon

Interesting presentation made at the final banquet of the World Power Championships took the shape of a chiming clock awarded to Doug Gordon who resigned the Secretaryship of the S.M.A.E. last June.

S.M.A.E. Chairman Alex Houlberg expressed the appreciation of the Council for the ten years excellent service put in by Mr. Gordon, who as readers will remember was awarded the Paul Tissandier Diploma by the F.A.I. earlier this year. In reply to his presentation Doug expressed the anticipation that he was getting the clock case this time and the "works" later; but he need not have any concern, for the timepiece was complete and ticking merrily.

Radlett Sequel

One sufferer of the downwind engine thieves, who are particularly notorious at Radlett during the All Britain Rally, was P. E. Norman who lost his well-known Mew Gull during the 1955 event. A letter was subsequently received at the AEROMODELLER Editorial Offices from a young reader who recognised the engine when it was offered to him for sale.

The sequel took place in St. Albans Juvenile Court last month when a boy aged 15 years pleaded guilty to stealing the engine from Mr. Norman's crashed model. The youth stated that he and other boys saw the model caught in a tree. They left it, but he returned a few days later and removed the engine. Later he sold it to another boy for 10s.

This offender was granted a conditional discharge and ordered to pay £3 17s. 10d. costs which, considering the engine alone was valued at £5, was poor recompense to our old friend, P. E. Norman. We only hope that the appearance in court of this particular engine thief will be a deterent to the other light-fingered gentlemen who loiter downwind

All Britain Rally

As a contrast to the attractions of Miss Carol Carr who added glamour to the 1955 event the St. Albans Club have this year engaged the services of M.G.M.'s Robby the Robot, who for the benefit of the unenlightened, features in the film "Forbidden Planet". Aeromodellers need have no fear, however, that Robby will be participating in the actual contests, although we doubt very much whether even a robot would succeed in the centre of the Team Race circle against some of the rougher and tougher pilots. Robby's main duties, so we understand, are to assist in the Spectator Event, just how we are not certain, but doubtless many thousands of our readers will find out when they go along to Radlett on September 16.

Contests are basically the same as last year with John Cunningham, Peter Bugge and Hedley G. Hazelden judging the concours, the scale section of this latter event featuring a £4 4s. 0d. increase in the prize list. Sir Frederick Handley Page will present the prizes, with the exception of the All Herts Trophy which will be presented by Lord Verulam, Mayor of St. Albans.

Radio Control in the South

RADIO-CONTROL flyers in the South-West, who until now have had a very thin time in the way of local rallies, contests, etc., will be interested in the announcement in CLUB NEWS regarding the formation of the "South-West Radio-controlled Model Flying Society". The Society aims to bring together all radio enthusiasts in the region for regular R/C rallies, contests, etc., and should meet a long-felt need.

Juste Married!

Our old friend, Juste van Hattum, who is Secretary of the Model Section of the Royal Netherlands Aero Club, was married on August 24th, to Miss Johanna Wilhemina Feijen at the Hague. Readers will join with us in wishing them many years of happy married life, and we sincerely hope that "Vans" new marital status will in no way affect his prolific output of aeromodelling words and drawings.

Maker's Modesty

In reply to an AEROMODELLER letter informing them of their success at the World Power Championships the Japanese makers of the O.S. Max 15 engine, the Ogawa Model Mfg. Co., sent the following reply:—

"Thousand thanks to you for your kindnest to give us the most happiest report of the result of the World Power Championships recently held at Cranfield, Bedfordshire. How we were surprised to know the winning engine in the event was our Max 15 engine used by Mr. R. F. Draper of England.

"The good result made by Mr. R. Draper was mainly due to his long time experiences and training in his own aeromodelling. Only the very happy opportunity for Max. 15 engine to be used by Mr. Draper.

"Here in Japan Radio Control method is getting popular among modellers. But it is in beginning stage. One or two experts are high in their techniques, but average modellers are in low. Spring and Fall event in this radio control are to be held periodically and applicants to these contests are increasing in number. Radio control kits are showing their good selling of late."

Yours very truly,

Ogawa Model Mfg. Co.

YASUO OISHI (*Manager*)

Service in the Model Shops

Earlier this year we commented on the poor service, due to inadequate stocks, offered by many Model Shops. At the same time we did mention that "many shops provided splendid service".

One of our regular readers quotes this phrase in a recent letter saying we are much too kind in our reference, and comments that with the experience of many years as a substantial aeromodelling customer, he knows of only two shops where he can get *anything* he wants and they are in London. Fairly obviously he cannot have shopped through the entire country, but taking London alone and bearing in mind the substantial number of model shops not only in Central London, but also in the suburbs, his statement gives food for thought.

He goes on to say: "You once commented upon a lack of 6 B.A. spanners in the shops. In this area there are four model shops where no B.A. spanners and few B.A. nuts and bolts can be purchased to this day. At the moment no Frog nylon props, 8 x 5 have been available for over three weeks and this probably the most popular size. I have had a new 1·49 Frog engine on order for six weeks and five days ago wrote to the makers, who informed me delivery was per return. This sort of thing is not confined to one make—no radio control sets are stocked and no information is available.

One dealer remarked, "it is no use stocking expensive goods, engines, radio, etc., as practically all the demand is from impecunious youngsters for three and ninepennys". There is no effort to induce or stimulate a demand, and consequently the customers, who can afford "expensive items", are neglected and have to obtain from London or by mail order from AEROMODELLER adverts.

Well, there it is! The only comment we would make is that model shop proprietors should examine once again their consciences and their shelves. It seems utterly ridiculous in this day and age, that an aeromodeller cannot buy a simple 6 B.A. nut and bolt and a spanner to fit. Added to which the retailer without an adequate display of goods on the shelf is doing himself out of trade besides disappointing the customer.

Wood Green Exhibition of Transport

Wood Green Corporation are organising an exhibition relating to the development of land, sea and air transport. There will be a fascinating collection of models of all kinds and the Air Section features B.O.A.C., B.E.A., De Havilland, Fairey Aviation and many other airline models.

Interested readers should attend between 1 p.m. and 9.30 p.m. from October 6th to 13th, excluding Sunday 7th, at the Gaumont Cinema, High Road, Wood Green, which is near to Wood Green Underground. Admission is free.

Stop Press

As we close for press, the results of the Wakefield Contest held at Hoganas in Sweden, come to hand. Conditions were bad from the weather angle, the contest finishing in continuous rain squalls. No competitor recorded five maximums, although three of them made four, plus near misses. Russians did participate this time with outstanding models. Winner Petersson appears to be a newcomer to international field. Kothe's model was flown by Hakansson of Sweden, who placed second last year and did outstanding job of proxy flying. O'Donnell brothers well and truly upheld British angle, and John in particular, was unlucky with extreme turbulence. Fea of Italy was unluckiest man, with four maximums and both models lost! Full illustrated report will be in next issue.

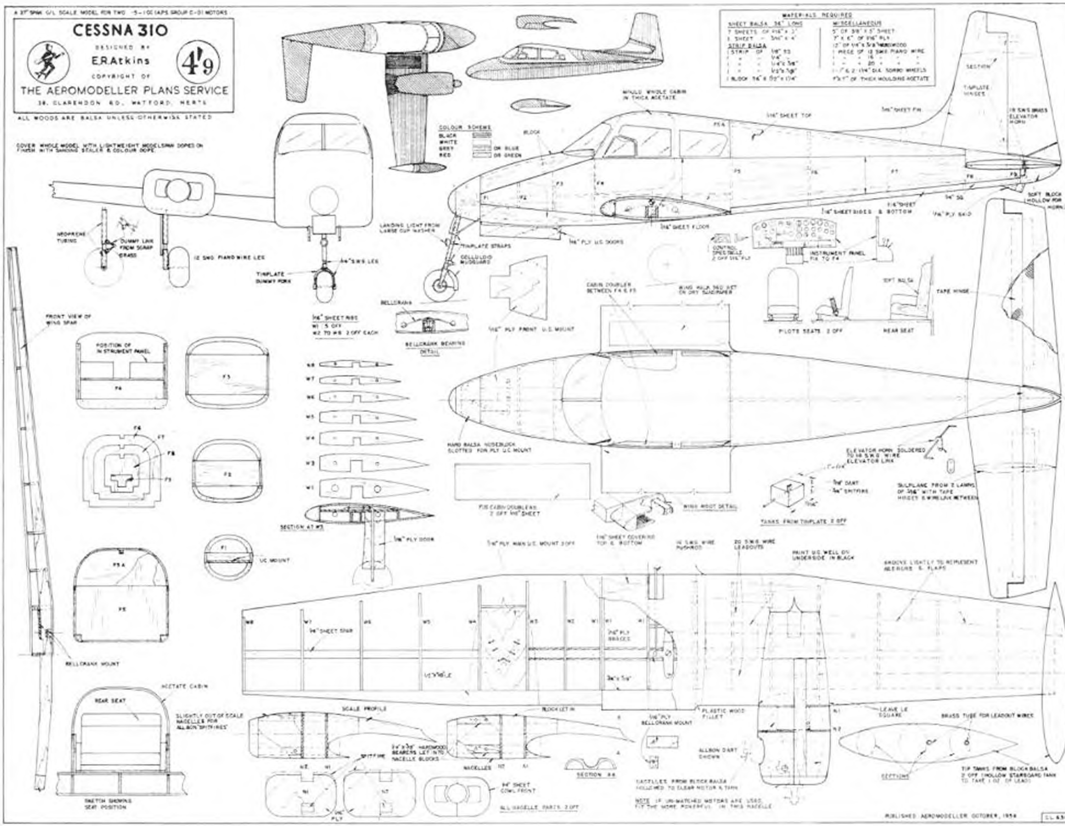
WAKEFIELD RESULTS, 1956

1.	Petersson, L.	Sweden	879	8.	Ivannikov, I	Russia	811
2.	Kothe, H	U.S.A.	874	9.	Kolpakov, V	Russia	809
3.	O'Donnell, J.	G. Britain	871	10.	Hyvarinen, R	Finland	808
3.	Knudsen, E.	Denmark	871	11.	Smolders, J	Netherl.	804
5.	Smirnov, E.	Russia	850	12.	Haag, R.	Sweden	801
6.	O'Donnell, H	G. Britain	848	17.	Lefevor, G.	G. Britain	750
7.	Ahman, R.	Sweden	829	34.	Revell, H.	G. Britain	604

TEAMS

1.	Sweden	2509	4.	U.S.A.	2444
2.	Russia	2470	5.	Italy	2228
3.	Great Britain	2469	6.	Denmark.	2204

All total times given in seconds.



FULL-SIZE COPIES OF THIS ⅛-SCALE REPRODUCTION ARE AVAILABLE PRICE 4s. 9d. POST FREE FROM **AEROMODELLER PLANS SERVICE**—please quote PLAN NUMBER CL 638 WHEN PLACING YOUR ORDER

Full-size (left) and model (below) display the colourful decoration of this tiny twin. Original model had upright engines, plan shows more suitable sidewinder arrangement for alternative engine sizes

Cessna 310

A Control-line twin for small engines by DICK ATKINS, Jr.

THE CESSNA 310 is one of several twin-engined "Business man's" aircraft which have been introduced to the American public in the last three years. It is of all-metal construction and seats five people including the pilot. It is powered by a pair of Continental 0-470-B, 6-cylinder, horizontal opposed engines rated at 240 h.p. each. They drive this little plane at a top speed of over 220 m.p.h. With five people, a full fuel load, and 225 lb. of baggage, it has a range of 1,000 miles cruising on 50 per cent. power at 175 m.p.h. The 310's sleek lines and beautiful paint job make it one of the most attractive aircraft in the air today.

This American model will provide many hours of flying enjoyment and keeping the weight down to choosing good, low density balsa is a key factor in its performance. The choice of two good, dependable engines is also important. If the proper engines are used it will perform equally well on either engine. The original was powered by ·8 c.c. Glow Plug engines and later with 1 c.c. for better performance.

Construction is started by cutting the main spar and plywood joiners to shape. Attach the centre section spar to the outer panel spars with the joiners. Then add ribs in proper position. Next cut the leading edge to shape and glue in position. Add the plywood bellcrank mount and bellcrank in position between the 1st and 2nd Rib. Form the main gear from 16 g. piano wire and bind to the plywood gear mount with thread, then cement thoroughly and place on wing. Next cover the bottom of the wing with 1/16 sheet balsa. Next step is to put in the lead outs and solder. Cut holes in each rib to clear the leadouts then you may cover the top of the wing. Cut an access hole near the bellcrank in the top of the wing to allow the push rod to be inserted.

Fuselage sides are cut to shape and joined with former F5 and then F1. Add the balance of the formers then the floor if cockpit details are desired. If no cockpit details are to be added, then eliminate the floor, make F4 as one piece. With cockpit details, 1/16 in. doublers should be added between F4 and F5 for stiffness. Place 1/8-square strips in lower aft position and 1/8-square upper aft. Cover with 1/16 in. sheet top and bottom. Next, tack wing in place and locate push rod. When you have ascertained its position, glue the wing in place. Leave the push rod long to adjust elevator travel. Tack the upper and lower nose blocks in place and contour them hollow to approx. 3/16 in. wall thickness. Form the nose gear and mount to the plywood sheet and glue in place. Next, glue the nose blocks in place.

After the rear tail block has been fitted, cut the tailplane and elevators from 3/32 in. sheet. Glue the tail in place then join the elevator halves with a wire and brass control horn. Add cloth hinges and mount elevator to push rod. Cut rudder from 1/8 in. sheet and position.

Canopy enclosure is formed from thick Cellastoid or suitable substitute and glued in place. If seats are included the canopy is added later. Make up engine bearer assembly on bulkheads N1, N2, and fix to leading edge, filling in the nacelle contour with block balsa, not forgetting the "twin-jet" exhaust ducts at rear, and allowing space for the fuel tanks.

Entire model is now sanded very smooth and then covered with Modelspan. Give three coats of primer, sanding between each coat with "Wet or Dry" paper until all pits and bumps are eliminated. The 310 is one of the most colourful private aircraft in production and details of the vivid schemes that can be applied are shown on the plan and in the photos on this page. Be careful to use masking tape with a clean edge when applying this decoration and you'll be rewarded with a model that is an eye-catcher wherever it appears.

Full report on the World Power Championships

By R. G. MOULTON

RON DRAPER WINS THE VICTOR TATIN INDIVIDUAL CUP, AND OUR TEAM, THE FRANJO KLUZ TROPHY

MOST WORLD CHAMPIONSHIPS are accompanied by a tense atmosphere of mixed expectancy and frustration, but this year's event at the College of Aeronautics will probably go down in history as one with the greatest ever mixture of contrasting weather.

Prior to the event we were promised a Russian team in person, but at the last moment an apologetic telegram tendered their regrets at not being able to attend. Extraction of some foreign models from H.M. Customs would make a story unto itself; the American collection took four days to clear London Airport, and it was only by the trojan efforts of S.M.A.E. chairman Alex Houlberg that the Canadian, Japanese and Australian models (which arrived far too late) competed at all! A total of £125 was lodged with Customs against Duty and Purchase Tax on these models before they could be freed from their red tape restrictions. In addition was the arrangement of visas for the Czech team, and, of course, the usual collection of people who turn up unannounced at Cranfield and expect a red carpet, or at least appear to want a lot for a little!

We are pleased to record that the organisation took each and every one of these items in its stride and coped admirably. Processing on the Sunday was uneventful except for the disqualification of George Upson's 2·55 c.c. radial Elfin, and only Mike Gaster's and Joe Eisen's models required a second check on the scales to make sure they came within the weight requirements.

Few models were anywhere near the formulae restrictions, and two would even qualify if the power loading were increased to 300 gm c.c.! Noticeable was the trend to larger areas for 2·5s and the increasing use of 1·5 c.c. engines.

Cranfield was in fine form on the Sunday with hardly any wind, and clear, dry weather for this day of processing and test flying. One detected a sense of wariness in the number of 90 second d/t's and repeated short power runs, yet quite a few models succumbed in what, for British models, were ideal conditions. Of the many "hot" climbers we were particularly impressed by the Swiss, Czechs, and Yugoslavs, and—for consistency—the proxy-flown American entries gave little cause to worry their fliers, unlike the Canadian group, who were beset by all sorts of trimming troubles, most of which were eventually ironed out through persistent test flying. Flying for Takeo Asano of Tokyo, young Peter Manville and his Uncle spent the day chasing up the local model shop proprietor for glowplug fuel and only managed to test at a late hour, but were quite happy with their far-travelled charge.

Came the dawn of the big day, and at Cranfield it was dull, dark and damp. Elsewhere in the country it was apparently much worse and indeed the weather records show that it was the worst August Monday in memory for most of Southern England. But at Cranfield we were lucky. By 10 o'clock the runway was drying rapidly, the wind had yet to make up its mind which way it wished to blow, and the usual crop of last minute tests terminated on *terra firma*. Ron Draper wrote off his reserve in the first test flight of the day, and Roberto Bacchi had his "Tucano" plummet like a javelin into the wet earth.

At 10:09 Grunbaum of Austria opened the 1956 Power Championships with a 1:38 flight, and immediately indicated a 90° wing swing in the wind—directly towards the buildings and hangars. This was tragic, for only the really high climbers stood any chance of remaining in sight for the maximum 3 minutes—or so we thought. As the round progressed it became obvious that the wind at 500 feet was not so bad as expected, and an area of general lift assured no less than 22 max's, excluding a pair for the unfortunate Djordje Zigic who suffered the ignominy of two over-runs.

It was not to remain dry for long, and low cloud scudding across the Bedfordshire hilltops brought with it a steady rainfall that extinguished fuses, dampened wings and persisted in spite of tantalising sunshine only a few miles distant. Downwind, the S. Midland Area retrieving squad were having what was to be their hardest round. Models were treed, on top of hangars, trying to get through windows (Roberto Bacchi again!) and Zigic's over-runs were miles away in corn. The local kids were having the time of their lives and scarcely a vacant tree could be found in the building area. It says much for the retrievers that during this round, and all of the ensuing contest, models were brought back promptly and without damage. Only one model was lost, but its cornfield landing ground was located and arrangements made for its return when found by air search.

Poor Alan King, with the farthest travelled proxy model from Australian Ron Bird, was one who needed no retriever. The high thrustline model V.T.O.'d slowly to come in on one attempt, got away better the next time, only to tuck its nose down and write off the intricate wing.

One might have imagined a glum atmosphere as Control and a convoy of cars and boxes were shifted across the 'drome for the second round. Rain was pouring down, and the visitors had obviously come prepared judging by the large number of plastic macs, yet all were cheerful and squelched to the new base on the perimeter.

For Germany the situation was indeed rosy. They had a perfect score on the board, and one wondered if the superb finish of their models had laughed away the raindrops to give them such a lead. Bowler-hatted Thompson, the bhoyo from Ireland, was only 7 secs short of the magic 3 minutes and became the first of six who dropped time on only one flight of the five. It could be said that this was unlucky, but in a contest like this, one has to make really sure of everything and a single second lost can eliminate one from a chance of winning.

By the time models became airborne in the SECOND ROUND the rain ceased, and with this blessing came a period of calm that was a deciding factor for all who relied on thermal assistance. The air was dead, completely free of turbulence, and flight times for this round were more or less indicative of true performance. It was then that the superior height gain of Posner, Gaster and Draper's British models became so apparent, and as if to underline the higher standard of his own "Gastove", Mike Gaster had a 2 second over-run that turned in a flight of more than eight minutes. With only twenty minutes to record a flight and feeling chary of his reserve with the Oliver engine, Mike anxiously awaited return of his first model and dashed to make a second attempt. Alas! In the harrassed moment of rushing to be within time, the tailplane was replaced askew and up on a key—the flight was a mere 1:18.

There were many "ifs" and "buts" floating around during lunch conversation and they mostly centred on the 20 minute allowance to make a flight. Certainly it seems insufficient for another attempt to be made after an over-run in calm weather—if the entrant is reduced to one model.

Gaster was not the only one to slip up in this vital second round. Cerny the Czech, fresh from his victory at the Soviet Internationals in Budapest, came down in 42 seconds with his very thin wings vibrating under wet and floppy covering. The number in the lead at the close of the first round was now reduced by half, and among those still leading were the very capable proxy fliers with Conover's (Lanfranchi), Ranta's (Bickerstaffe) and Eisen's (McNulty) models from across the Atlantic. This last model was one of the most potent on the field, and if only it had had a more efficient means of stopping the motor (other than by using a simple sport model tank) it might well have gone on to a higher placing.

The nations represented on the leader board were Canada (2), Germany (2), Great Britain (2), Switzerland, Yugoslavia, U.S.A., Czechoslovakia and Finland. It was still pretty much anyone's guess who might win, and as the party packed up for lunch the rain came down again in buckets!

A plastic sheet protects the Swiss model resting in a puddle in our heading, while in the next picture, the victorious British team, Upson, Posner, Buskell (Manager), Draper and Gaster, relax in brilliant sunshine. Such was the weather! Photo 1 shows the beautifully constructed shallow dihedral model by Fran Maria Rudolph (9th) who is filling up with a Hypo Syringe. 2. Hugo Leppert, also from Germany, and a fine constructor. He curls his plastic blades forwards. 3. Young Peter Manville and his Uncle attend to Aanna's K& B 15 (11th). Model was made of balsa and cypress, had a fine glide. 4. McNulty observes the fuel flow to the Tiger Cub on Eisen's lightweight (15th). 5. Irish in the rain. Morelli (10th) is checking engine run on his Tiger, while Thompson (7th) looks on in bowler



Emil Fresl, who has been in more International teams than any other individual, releases his successor to Achilles at left. 3 secs robbed him of a chance in the fly-off, was 4th. Next, Hans Felis, winner of the Saarbrucken Cup this year, spoiled his first flight, was 21st. Rudolph Cerny was winner of the Soviet International spoiled his second flight, was 23rd. At right, Louis Bausch of Holland demonstrates a fine V.T.O. by his long [illegible] design, affected by rain in second round, was 18th

Miraculously the air began to clear soon after the THIRD ROUND began. There was still a little rain about, but conditions were improving, and at times models were actually gliding out of the 'drome in what was regarded as an upwind direction. In this kind of weather it was evident that height gained on the power run was worth much more than having a brilliant glide from moderate altitude. Thus we found Frau Maria Rudolph, wife of the German Team Manager, returning 2:34 after a pair of max's while Posner, Draper, Conover, Fresl and Masek went high to make sure of a third maximum each. This was the round that spoiled another fine proxy chance for Ranta's model flown by John Bickerstaffe. Oliver-powered, the "Reek" had a forward lean on its V.T.O. leg, and immediately after take-off it adopted level attitude to climb after a flat run. In the dead air John had no chance and after two attempts it failed to get away before the wing lift could take over from the downthrust.

U.S.A. team below, showing large area models from Conover (Lanfranchi), Sladek (Jays), Huffman (Gil Coughlin from Tacoma, Washington) and Hartill (Green). By good fortune all had motors they really understood

How to do it—and how not. Left, Carlo Bergamaschi (6th) releases perfect V.T.O. of his Tabu, while below, Ranta's "Reek" is seen in a typical attempt immediately after vertical launch. Downthrust pulls the model into level, if not diving flight. Had 4 max's and a blank in which two such attempts were made by proxy Bickerstaffe. Model was otherwise as potent as the winners, placed 25th

By now a free and easy atmosphere spread over the crowded contest area. Dispersed encampments from each of the sixteen nations were surrounded by admiring visitors, and the tenseness of the meeting relaxed as the pattern of 20 minute periods was dispensed through the afternoon. A million-to-one chance that took place quite easily was the mid-air collision of Morelli's and another model while on the glide; they were each allowed another flight! Also there was an amazing display of wing flutter by Piesk's model on a test flight.

Poor Mike Green never did get quite used to the huge model sent over by Hartill, and it finally went in under full honours with at least four newsreel and T V cameras morbidly recording every one of the 21 seconds it was airborne.

Recovery was no longer a problem, and in fact conditions had changed to such an extent that time-keepers and competitors had a long walk out to the centre of the 'drome to avoid landing in the control area. By the time all third round flights were on the score-board (the operation speed of which was such that results were available only five minutes after each flight had been made) the pattern for team victory was almost set with a solid British lead, with five people tying for the individual honours. These included Emil Fresl and Jiri Masek. Neither deserved what happened to them in the FOURTH ROUND, but, as we said before, one is never certain. Fresl lost 3 seconds and Masek had to put in a less efficient reserve to get a time in after damaging his model on the first attempt.

Others who were "unlucky" earlier were now creeping well up the list; Peter Manville with the Japanese "Skokiaan" and Thompson with another African name, "Zimbabwe", Carlo Bergamaschi with "Tabu"—Mike Gaster now with the Oliver-powered model, were chasing the leaders.

The three who remained out on top were Draper, Posner and Conover, in the very capable hands of the one and only Lanfranchi. Silvio was right on form. He likes old and well-flown models, and Laurie Conover certainly sent over a veteran. It was big, with a 506 sq. in. wing, and the Torpedo 15 was doing very well to drive the 8 x 5 prop and take the "Lucky Lindy" (after Col. Lindbergh) so high. Other models from the U.S.A. were diverse in outline, with Vic Jays flying Sladek's low aspect model and Coughlin the Wakefield and speed flier, handling Huffman's entry.

The fourth round had seen the beginning of really fine weather, and another 22 maximums. Now the battle for team honours was on between U.S.A. and G.B., and much depended on the leading British trio, Draper, Posner and Gaster, George Upson being up and down the scale with his aged pylon model. At times it was like a British Nationals meeting seeing so many familiar British faces eyeing each other's chances.

Four tall men. Schenker (9th) who did best for Switzerland. The unfortunate Bond Baker (39th) with high thrust design. Sweden's expert Rolf Hagel who suffered from trimming prangs, was 42nd, and jovial Houtelle from Belgium who flew a standard Mallard kit model to 30th place

There was no need for concern, and the top trio made three minutes seem oh, so easy in what became an uneventful FIFTH ROUND. Peter Manville secured another max to bring the Japanese model into a very creditable 11th place, and Mike Gaster showed one and all the way to go up fast in a manner that made him the focus of Czech and Slav attention throughout the meeting. Up till now one had tended to regard the Czechs as being third in team performance rating, and it was a pleasant surprise to find that the keen Dutch group had done so well, and the irrepressible Irish close behind them in fourth place.

The fly-off to decide who should hold the Victor Tatin individual Cup revived the meeting from its free-and-easy state into an electric atmosphere of anticipation. The hour was 18:30, and British team members Posner and Draper were established on the tarmac long before Silvio arrived with much flourish and bravado! It was no secret that the odds were on Posner and his orange silk covered "Dream Weaver", but few knew that he had reduced his motor run to 13 secs to make sure of a flight, while Draper adjusted for another second on the engine run of his OS MAX-1 15 engine and now had 14.

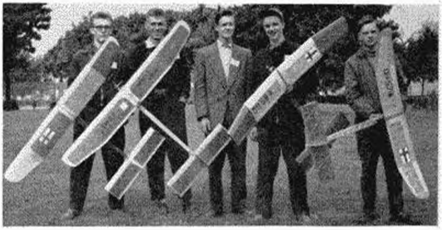
The chiff-chaff was over, and all three ready for the signal. Within a moment, all three engines were running, and Posner first away, the exhaust tracing a vertical spiral through the clear blue sky as Draper and Lanfranchi followed in quick succession. All cut—and all under 15 secs. Posner had at least 20 feet altitude over Draper and perhaps 60 feet over Conover's long span "Lindy", so now it depended on the glide. One could have heard a pin drop as all three models drifted slowly across the field and only the burble of motor cycle exhausts, as they chased up the runway to retrieve, served to break the tension. After three minutes all were still at a height capable of holding lift, but there was none there, and Draper's red "Crescendo" was now highest, gliding in slow circles, although sinking faster toward the end of the flight.

The result was known before they had all touched down, and it was something of an anti-climax—after the trials of the day, the contrasts in the weather, the annoying misfortunes and the early anticipation of a victory for the host country—that Ron Draper's success should be accepted in such a modest manner.

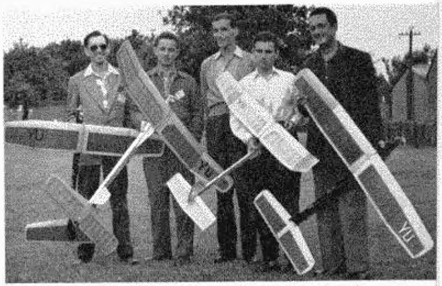
Random Notes

Japanese model had an American K & B 15 engine—the winner used a Japanese OS MAX-1 15. It's strange how the goods on the other side of the fence always seem to be more attractive than one's own home product!

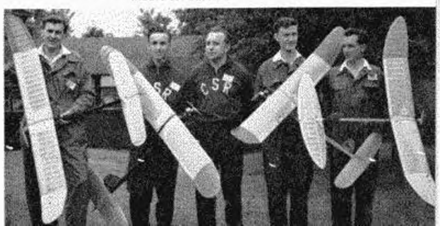
When Hugo Leppert's timer stuck, and the d/t failed, his model flew away for more than 30 minutes. Retrievers on foot and motor cycle chased underneath, unaware of each other's efforts and, of course, the motor bike got to the model first. Lads on foot had a long walk back!



A young and very keen team came from Finland, showing similarity in model design and selection of power unit (Webra Mach I). They are Pimenoff, Osterholm, Partinen (Manager), Manninen and Rautio. Below, the unlucky Yugoslavs always had a smile though they were constantly suffering from misfortune. Fresl, Kmoch, Pracek (Team Manager), Gunic and Zigic with four of their very fine models



Below, the Czechoslovakian team were well received and one of the most sociable teams present. All are fine flyers and if they had more powerful engines well . . . They are Cerny, Ruzek, Nemec (Manager), Hajek and Masek. Note the similarity of the latter's model to Gaster's



Predominant features of 1956 models were the widespread use of clockwork timers, larger wing areas (Posner's 426 sq. in., Conover's 506 sq. in. and Draper's 480 sq. in.) and the employment of vertical take-off by 70 per cent. of the entries.

Hardest hit of all teams was that for Yugoslavia. The number of incidents that affected each of their four fliers would have been enough for many others to pack up and retire, but they pressed on with smiling faces.

Congratulations to Silvio Lanfranchi—1st in the '52 contest with Wheeler's model, 2nd in '54 with his own and now 3rd with Conover's. Quite an achievement for this evergreen modeller.

Commiseration for Swiss Team Manager, Arnold Degen, who was kept in bed from the time of the briefing until it was time to leave. Hard luck, Arnold! We hope you feel better now.

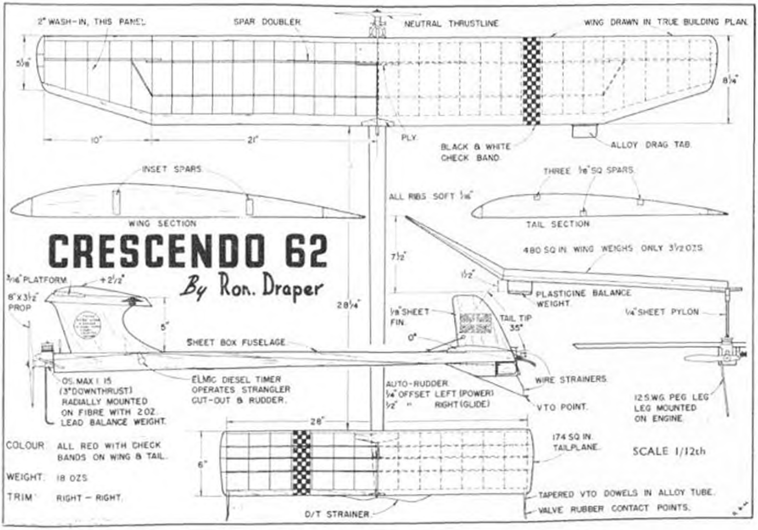
ENGINES USED AT WORLD CHAMPIONSHIPS

Webra Mach 1 2·47 c.c. diesel	22	Super Tigre 2·46 c.c. glowplug	6
K & B Torpedo 15 2·43 c.c. glowplug	19	Taifun Tornado 2·47 c.c. diesel	3
Oliver Tiger 2·49 c.c. diesel	14	Elfin 2·49 c.c. diesel	3
E.D. Racer 2·46 c.c. diesel	9	Frog 150 diesel	3
Czech AMA 25 diesel	8	Webra Winner 2·46 c.c. diesel	2
Webra Record 1·48 c.c. diesel	7	Elfin 1·49 c.c. diesel	2
		O.S. Max 1 (15) 2·49 c.c. glowplug	2

One each of the following types: Taifun Hurrikan 1·49 c.c. diesel, Oliver Tiger Cub 1·47 c.c. diesel, Elfin 1·8 c.c. diesel, Atwood Wasp ·8 c.c. glowplug, Cox Thermal Hopper ·8 c.c. glowplug, Taifun Rasant 2·46 c.c. diesel, Aero 250 2·5 c.c. diesel and Emil Fresl's own 2·15 c.c. motor.

About the winner

RON DRAPER is Hon. Secretary of the Coventry & D.M.A.C., been modelling for 16 years and is devoted to the hobby. Employed as an Architectural Assistant, is 28 years old, and has a most understanding wife. Spent the three weeks prior to the event in making the winning model. Intended as a duplex job, for F.A.I. with the MAX 15 engine, and open events with a K & B 19. Like all winners of the World Power Championships since '52, was reduced to having one model by the time the contest started. Has flown in four contests at Cranneld, and placed in the first three in all of them. Others were the '54, '55 and '56 South Midland Area Rallies. His model, drawn below, is seen immediately after V.T.O. release at left.



WORLD POWER CHAMPIONSHIPS, 1956

RESULTS

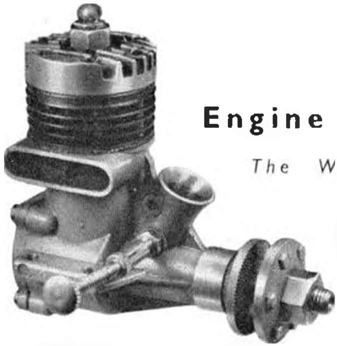
1	DRAPER, R. ...	Gt. Britain ...	3:00	3:00	3:00	3:00	3:00	15:00 +5:20	O.S. Max. I (15)	†
1	POSNER, D. ...	Gt. Britain ...	3:00	3:00	3:00	3:00	3:00	15:00 +4:52	Oliver Tiger	†
1	Conover, L. H. ... (Lanfranchi)	U.S.A. ...	3:00	3:00	3:00	3:00	3:00	15:00 +4:15	K & B 15	
4	Fresl, E.	Jugoslavia ...	3:00	3:00	3:00	2:57	3:00	14:57	Fresl 2.15	†
5	Bergamaschi, C.	Italy ...	3:00	2:55	3:00	3:00	3:00	14:55	Webra Mach I	
6	Thompson, J. ...	Ireland ...	2:53	3:00	3:00	3:00	3:00	14:53	Oliver Tiger	
7	Fiks, G.	Holland ...	3:00	2:36	3:00	3:00	3:00	14:36	Webra Mach I	
8	Schenker, R. ...	Switzerland	3:00	3:00	2:32	2:56	3:00	14:28	Taifon Tornado	†
9	Rudolph, Frau M.	Germany ...	3:00	3:00	2:34	2:41	3:00	14:15	E.D. 2.46 Racer	
10	Morelli, A. ...	Ireland ...	2:11	2:51	2:58	3:00	3:00	14:00	Oliver Tiger	
11	Asano, T.... ... (P. Manville)	Japan ...	2:21	3:00	2:26	3:00	3:00	13:47	K & B 15	†
12	Gaster, M. ...	Gt. Britain ...	3:00	1:18	3:00	3:00	3:00	13:18	E.D. 2.46 Racer	†
13	Huffman, W. F. ... (G. Coughlin)	U.S.A. ...	2:43	2:54	2:02	2:30	2:51	13:00	K & B 15	†
14	Masek, J. ...	Czechoslovak.	3:00	3:00	3:00	1:34	2:22	12:56	A '/' 25	
15	Eisen, J. ... ... (F. McNulty)	Canada ...	3:00	3:00	2:46	2:16	1:50	12:52	Oliver Cub	†
16	Pfenninger, M. ...	Switzerland	1:50	3:00	2:05	3:00	2:56	12:51	Taifun Rasant	
17	Sladek, R. ... (V. Jays)	U.S.A. ...	3:00	2:24	1:26	3:00	3:00	12:50	Oliver Tiger	
18	Bausch, L. ...	Holland ...	2:22	1:53	2:45	3:00	2:49	12:49	Webra Record	
19	Piesk, L. ...	Germany ...	3:00	1:55	2:27	3:00	2:23	12:45	Webra Mach I	†
20	S'Jongers, J. ...	Belgium ...	3:00	2:05	2:04	3:00	2:33	12:42	Webra Mach I	
21	Osterholm, S. ...	Finland ...	3:00	3:00	1:53	2:01	2:32	12:26	Webra Mach I	
22	Hormann, G. ...	Austria ...	0:29	2:56	3:00	3:00	3:00	12:25	K & B 15	
23	Cerny, R. ...	Czechoslavak.	2:42	0:42	3:00	3:00	3:00	12:24	AMA 25	†
24	Friis, H. O. ...	Sweden ...	0:21	2:57	3:00	3:00	3:00	12:18	Webra Mach I	
25	Ranta, S. ... ... (J. Bickerstaffe)	Canada ...	3:00	3:00	0:00	3:00	3:00	12:00	Oliver Tiger	†
26	Domberger, H. ...	Austria ...	3:00	2:20	1:46	2:25	2:24	11:55	E.D. 2.46 Racer	
27	Teunissen, A. ...	Holland ...	2:20	3:00	1:45	2:30	2:15	11:50	Webra Record	*
28	Hajek, V. ...	Czechoslovak.	2:48	3:00	3:00	0:00	3:00	11:48	AMA 25	
29	Upson, G. ...	Gt. Britain	1:50	2:43	1:55	3:00	1:56	11:24	Elfin 2.49	
30	Houtrelle, H. ...	Belgium ...	1:51	1:48	2:03	3:00	2:13	10:55	K & B 15	
31	Hutjes, W. ...	Holland ...	1:43	2:11	2:33	2:13	2:08	10:48	Webra Record	
32	Manninen, P. ... (Jaaskenlainen)	Finland ...	3:00	1:58	1:34	1:26	2:39	10:37	Webra Mach I	
33	Raulio, H. ...	Finland ...	1:35	2:05	2:28	1:12	3:00	10:20	Webra Mach I	
34	Ruzek, L.... ...	Czechoslova.	1:59	2:16	1:58	2:17	1:49	10:19	AMA 25	
35	Woods, D. ...	Ireland ...	1:50	1:38	0:56	3:00	2:53	10:17	E.D. 2.46 Racer	
36	Zigic, D.	Jugoslavia ...	0:00	3:00	2:13	2:50	2:02	10:05	K & B 15	
37	Leppert, H. ...	Germany ...	3:00	1:08	2:24	2:25	0:48	9:45	Webra Mach I	†
38	Hoyer, E. ...	Austria ...	2:43	1:43	2:38	1:50	0:00	8:54	Webra Record	
39	Baker, R. S. B. ...	Australia ...	1:25	1:17	2:17	1:27	2:14	8:40	Webra Record	
40	Zapata, R. ...	Italy ...	3:00	0:00	1:45	1:44	2:08	8:37	Atwood Wasp	†
41	Lippens, G. ...	Belgium ...	1:35	1:34	1:28	1:44	2:03	8:24	K & B 15	*
42	Hagel, R. ...	Sweden ...	2:20	3:00	0:00	0:00	2:37	7:57	Webra Mach I	
43	Jeane, L.	Belgium ...	0:00	3:00	1:32	1:42	1:28	7:42	K & B 15	
44	Grunbaum, P. ...	Austria ...	1:38	1:51	1:27	1:14	1:17	7:27	E.D. 2.46 Racer	
45	Monti, F. ...	Italy ...	1:21	1:34	1:08	1:39	1:27	7:09	Super Tigre	
46	Gunic, B.	Jugoslavia ...	1:27	0:00	2:38	3:00	0:00	7:05	Webra Record	
47	Kmoch, V. ...	Jugoslavia ...	0:33	3:00	0:00	1:22	1:43	6:38	Aero 250	†
48	Lorimer, H. ... (G. French)	Canada ...	0:18	1:20	1:33	1:43	1:22	6:17	K & B 15	†
49	Hamma, W. ...	Germany ...	3:00	3:00	0:00	—	—	6:00	Webra Mach I	
50	Etherington, W. (J. Done)	Canada ...	1:12	1:11	1:11	1:32	0:00	5:06	Oliver Tiger	
51	Bacchi, R. ...	Italy ...	3:00	0:24	0:00	—	—	3:24	Super Tigre	†
52	Maibach, F. ...	Switzerland	3:00	0:00	0:00	0:00	0:00	3:00	K & B 15	
53	Hartill, W. ... (N. Green)	U.S.A. ...	2:23	0:21	0:00	0:00	0:00	2:44	Webra Mach I	
54	Browne, D. ...	Ireland ...	0:30	—	—	—	—	0:30	Elfin 2.49	
55	Bird, R. E. ...	Australia ...	—	—	—	—	—	—	Webra Mach I	
56	Schiltknecht, P. ...	Switzerland	—	—	—	—	—	—	Webra Mach I	
57	Pimenoff, S. ...	Finland ...	—	—	—	—	—	—	Webra Mach I	

† *Models within 5% of formulae weight requirements.*
* *Models 50% over weight for engine capacity (300 gm./c.c.).*

TEAM RESULTS FOR FRANJO KLUZ CUP

1	Great Britain	2598	9	Jugoslavia	1927
2	U.S.A.	2450	10	Belgium	1921
3	Holland	2355	11	Canada	1869
4	Ireland	2350	12	Italy	1841
5	Czechoslovakia.. ...	2228	13	Switzerland	1819
6	Germany	2206	14	Sweden	1215
7	Finland	2003	15	Japan	870
8	Austria ...	1994	16	Australia	520

Launching studies. Top, Jiri Masek and Gastove-like model was at one time leading. Next, Austrian release from grass by holding leading edge is displayed by Grunbaum above and G. Hormann below. Bottom shows Allan King with Ron Bird's model in the wet. Spiralled in on second attempt



Engine Analysis No. 26

The World Championship winning

OS MAX-1 15

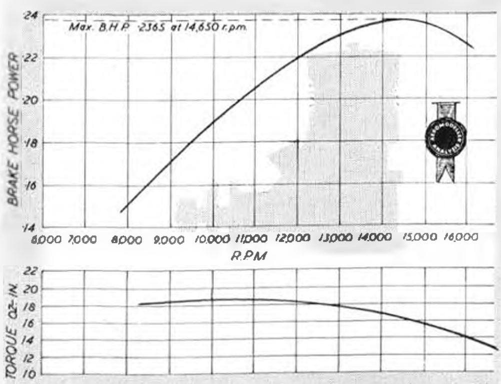
reviewed by R. H. Warring

THE MAX-1 15 is a small engine for a 2·5, and weighs a fraction less than 3½ ounces. Like most glow motors it does not develop a great deal of power low down (although it makes a lot of noise it is not really working very hard), but once it gets past about 11,000 r.p.m. the power curve just goes on climbing. The plotted power peak from test data was established as 14,650 r.p.m. at which speed the brake horse power was only a little under ·24 or nearly ·07 B.H.P. per ounce, which is double that of most diesels. Hence it must have a special appeal for lightweight free-flight duration work or any combination where high power and light weight can be put to advantage.

Fuel specified by the makers is methanol, nitromethane and castor oil, with no specific proportions, but particularly recommending the addition of detergents to avoid gumming up the engine. For general running test purposes we used a conventional methanol-castor mixture with 10% nitromethane on the basis that this was essentially a racing engine and could be tested fairly on doped fuel.

For starting purposes—and as is typical with most glow motors—the MAX 1 has a "soggy" feel. It does start fairly readily although not as easily as some glow plug jobs. It does not like being flooded, but it starts readily with the needle valve in the running position providing it is primed or finger-choked. It should be pointed out that this engine is normally supplied with restrictors for the air intake, the smallest restrictor giving the highest fuel suction. A standard K.L.G. glow plug was needed in place of the Japanese plug and proved quite satisfactory. Design of the MAX-1 follows the accepted standard of optimum glow motor performance with 180 degree annular exhaust and diametrically opposed transfer.

The cylinder follows typical American practice in being machined from steel with integral cooling fins with a detachable light alloy head. The cylinder is a beautiful "plug" fit in the crankcase unit and is held down with two long screws extending through the head. Four additional short screws hold the head down on to the cylinder, wide gaskets being used between both mating surfaces.



SPECIFICATION

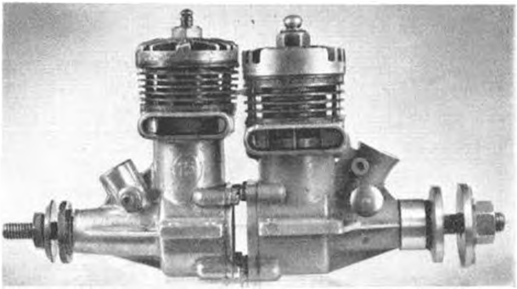
Bore: ·599 in.
Stroke: ·549 in.
Displacement: 2·53 c.c. (·154 cu. in.)
Bore/Stroke ratio: 1·03
Bare weight: 3 7/16 ounces
Max. B.H.P.: ·2365 at 14,650 r.p.m.
Max. torque: 18·5 ounce-inches at 10,500 r.p.m.
Power rating: ·093 B.H.P. per c.c.
Power/Weight ratio: ·07 B.H.P. per ounce

Manufacturers:
Ogawa Model Mfg. Co.,
518 Kumatacho,
Higashi Sumiyoshi,
Osaka, Japan

PROPELLER — R.P.M. FIGURES

Propeller dia. pitch	*r.p.m.*
8 x 6 (Stant)	10,200
8 x 5 (Stant)	12,000
7 x 6 (Stant)	13,600
7 x 4 (Stant)	16,000
6 x 5 (Stant)	16,800
Fuel: Methanol-castor plus 10% nitromethane	
9 x 3 (Tiger)	11,800
8 x 4 (Tiger)	13,100
8 x 3½ (Tiger)	13,800
Fuel: Methanol-castor plus 40% nitromethane	

Inevitable comparison is that of MAX-15 and the Torpedo 15. Though structurally similar, the MAX is different in many respects, not the least being its small exhaust port at top of large stack in crankcase

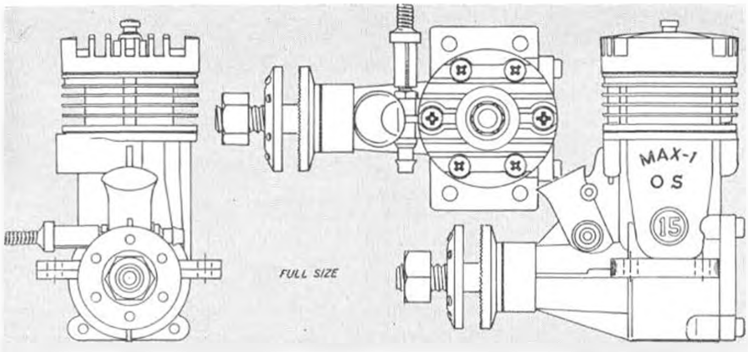


A commendable feature is the piston which appears to be of steel and is exceptionally light, being turned away to very thin walls. It is flat-topped with a straight baffle and appears to have been ground between centres—an accurate, if laborious method of finishing. The connecting rod is a light alloy forging bushed at the big end with a driven-in bronze bushing. The $\frac{5}{32}$ in. diameter crankshaft appears to be nickel steel, hardened, and the web is turned away to provide a counter weight opposite the crank pin, it runs in a brass or bronze bushing pressed into the crankcase. A surprising degree of corrosive attack produced within the engine during some two hours' running time was quite remarkable. A rust-like powder appeared almost everywhere with a definite etching attack on the metal itself where there was no actual rubbing contact, *e.g.*, the inside of the crankcase, the con-rod, around the crank disc, outside the cylinder where fuel had dribbled down, etc. None of the rubbing surfaces themselves, however, showed the slightest signs of scoring or undue wear. It would appear that internal cleaning of the engine and flushing out would be essential to preserve its life, operated on doped fuels.

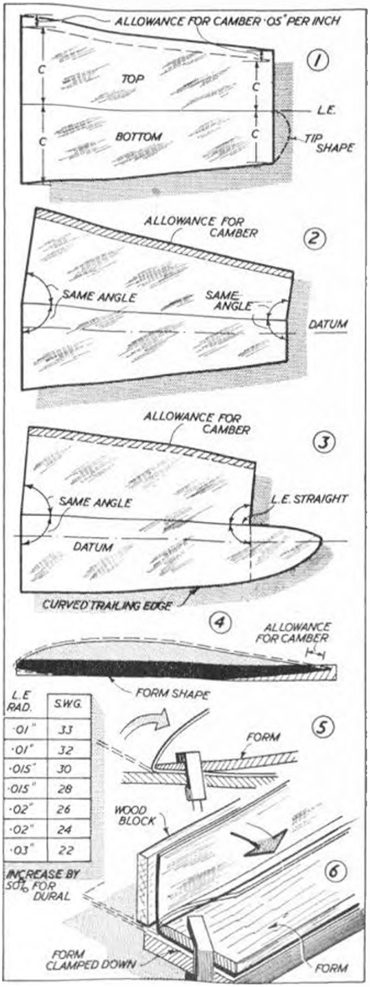
Internal clearances throughout are held to a practical minimum and the standard of workmanship is excellent throughout.

Summarising: A well designed engine with an eye on minimum dimensions without "skimping" in any direction, one which appears to have been built with meticulous accuracy and involved considerably more man hours than standard on Western production; and with a performance rating of the highest order. Although the example tested was over-capacity for the International class, the manufacturers assure us that all O.S. MAX-1, 15 units produced since March, 1956, have a maximum bore of ·597 in. and stroke ·540 in., offering a capacity of 2·49 c.c. They are also attending to the question of corrosion by investigating material.

The pair of engines used by Ron Draper at the World Championship Meeting were purchased since the above changes were made to the bore and stroke and therefore comply with the F.A.I. requirements. Ron chose a MAX-1 for his model as it seemed to offer a more steady output than other engines of similar capacity, and this was borne out by his performance at Cranfield. He used a high nitro-methane content in his fuel and had a specially made radial mount for inter-changeability with other engines on the same model.



Aeromodelling *Step-by-Step*



L.E RAD.	S.W.G.
·01"	33
·01"	32
·015"	30
·015"	28
·02"	26
·02"	24
·03"	22

HOW TO MAKE A PAIR OF METAL WINGS FOR ANY TEAM RACER OR SPEED MODEL.

AEROMODELLERS are more used to working with wood than metal and tend to avoid using the latter except where strictly necessary. But where weight is not a critical factor, metal structures may offer many advantages. For control line speed models or team racers, for instance, metal wings are smoother, cleaner aerodynamically and just as easy to fabricate as built up or carved wooden wings—and considerably stronger.

The standard method of using metals for wing construction is to bend an envelope of thin sheet metal to the wing section required. The main bend is made about the leading edge, which restricts the wing planform to a certain extent, and the top and bottom surfaces are brought together and joined at the trailing edge. Such wings are generally slipped over a wooden stub spar assembly protruding from the fuselage, usually carrying one or two ribs, and the metal envelope secured with woodscrews. Alternatively, a one-piece metal wing can be made around a basic frame, the finished wing let into the fuselage and suitably secured. The former method is the simpler from the layout and metal-working point of view.

For a start the required envelope pattern must be marked out on a suitable piece of sheet metal. For average control line model sizes 28 or 30 s.w.g. aluminium is quite satisfactory. This can be reduced to 33 s.w.g. if you want to save some weight. Knowing the area of the wing the actual weight of metal involved can readily be calculated from the layout pattern if necessary; 28 s.w.g. aluminium sheet weighs ·0014 ounce per sq. in.; 30 s.w.g. aluminium sheet ·0012 ounce per sq. in.; and 33 s.w.g. aluminium sheet approximately ·001 ounce per sq. in. Thus, roughly, the envelope of a 100 sq. in. wing would weigh ·3 ounce in 28 s.w.g. aluminium and ·2 ounce in 33 s.w.g. aluminium. With the latter thickness of metal, however, possibly more support would be required with internal ribs and spars. Aluminium is the preferred material for wing envelopes, being very easy to bend. Alclad is rather better from the durability point of view. Dural is stronger, very slightly heavier (the difference is small enough to be ignored), but harder to bend around the leading edge radius.

In the case of a straight tapered wing, layout of the envelope pattern is simple (**1**). Root and tip chords are laid off about the leading edge line and the overall width of the top surface increased by ·05 in. per inch chord to allow for cambering. This corresponds to a typical section of about 8-10 per cent. thickness.

Aerodynamically, such a wing is actually swept *forward* and so for a true straight wing the *aerodynamic centre* line or quarter chord point is perpendicular to the fuselage centre line. Thus the leading edge is swept back slightly, but layout is just as simple (**2**). The angle between leading edge and root chord is simply duplicated to lay out the root edge of top surface, and the same for the tip. A similar allowance is added for camber as before.

Elliptic planform wings can be plotted in a similar manner, provided there is sufficient straight length of leading edge (**3**). The top surface finishes at the end of this straight run of leading edge, the elliptic planform over the remainder of the wing being incorporated in the bottom surface only. The two trailing edge curves are identical.

For clean and accurate bending of the envelope it is best to make a hardwood form (1). This need only be a piece of sheet about half the thickness of the required thickness with the front bottom portion shaped to conform to the aerofoil section required. The front edge is radiused to conform to the wing section. The table gives *minimum* radii around which aluminium sheet can be bent satisfactorily. Sharper bends may result in the metal cracking.

The method of using the form is to clamp it against the leading edge line on the sheet, supported by a stiff backing—*e.g.*, another piece of hardwood or the building board (5). The edge of the flat sheet is lifted up and against it laid a wooden block at least as long as the metal sheet. Grasping this block, the metal is forced around the edge of the form (6). Remove the clamps if necessary to complete the bend (always bearing down on the metal with the wooden block) which when released will "spring" slightly. It should then be a fairly simple matter with finger pressure to finally shape the envelope to the required aerofoil section.

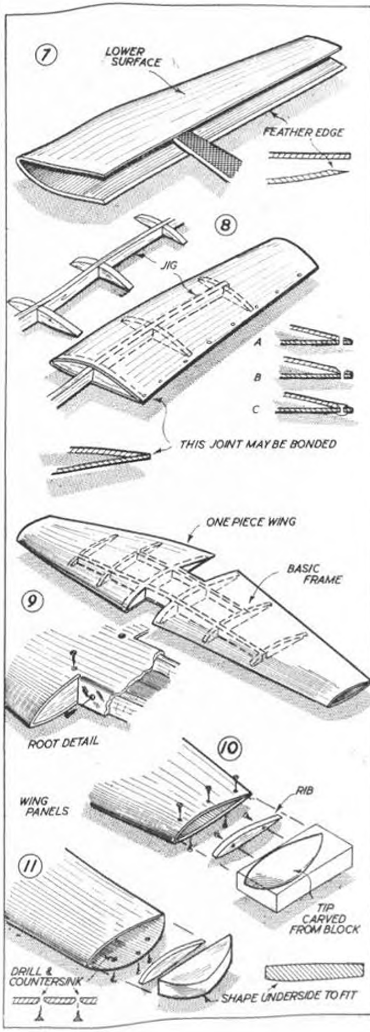
The trailing edges must then be prepared for jointing (7). It is generally sufficient to feather the edge of the upper surface sheet only, although both surfaces can be feathered if you prefer. This job is easily done with a flat file.

Before completing the actual joint it is recommended that the envelope be assembled around a temporary wooden jig (8). This will ensure that it stays true for drilling and riveting. Small aluminium rivets with countersunk heads are best, about $\frac{1}{16}$ in. diameter. Holes for these rivets are drilled (A), countersunk with a larger drill (B) and the rivet then inserted and made off. Rivet length should be such that no more than [illegible] in. of shank protrudes before making off. If dural rivets are used (identified by the letter "D" embossed on the heads of the rivets) these require heating before use to soften them.

Riveting with aluminium rivets is very easy, but an alternative (which gives a somewhat cleaner joint) is adhesive bonding using one of the modern metal-to-metal glues now available. Glue is applied to both surfaces and the trailing edges clamped together and left to set. Such a joint will never fail, if properly made. Whichever method is used, the wing trailing edge can be finished off to a knife edge, if required, by filing or lightly grinding (a sanding disc in a small power drill is excellent for this job, carefully applied).

Once the technique of making simple wing envelopes has been mastered, no difficulty should be experienced in producing one-piece wings in metal. These are best made around a permanent basic frame of hardwood, consisting of stub spars and ribs (9). The centre section sheet (upper surface) is folded down alongside the spars and secured with small woodscrews. Additional woodscrews secure the metal to the basic frame at other strategic points. With a one-piece wing the two halves are best formed separately, then the basic frame inserted and the trailing edges joined.

To avoid complicated metal working, tips are easiest made from carved hardwood block (10). A fitting tip rib secured to the block makes the whole tip a plug fit in the end of the wing envelope, where it is secured with woodscrews. Alternatively, the tip shape can be cut in the bottom surface sheet, the tip block shaped to fit snugly on this sheet and anchored with woodscrews (11). A tip rib is still advisable, screwed to the tip block. After securing the tip can then be carved and sanded down to conform to the wing section, feathering off the metal edges to get a really clean outline. This is the best method for finishing off an elliptic wing shape as in (3).



WORLD NEWS

ONE OF THE great pleasures to be had from reading correspondence sent to AEROMODELLER from all quarters of the globe, is that of studying the many techniques applied to suit varying conditions. Some people enjoy the most remarkable conditions, as the following quote from *West Coast Model News* (**U.S.A.**) indicates. The scene was Ft. Lewis, Washington and the occasion, the area International Elims. "The most spectacular flight was one by Jerry Everett, whose F.A.I., VTO lifted about one foot, hovered around the take off area hanging on its prop for 10 seconds, then gave a spurt to 30 ft., quit, levelled off and proceeded to catch a thermal for a three minute flight".

News from **Australia** is that the State of Victoria (the one at extreme bottom right of this vast continent), has the honour to organise the 10th Nationals over December 28th-January 3rd, including just about every event one can think of. Entries are invited from all Australian and Overseas modellers and must be made by November 1st to J. P. Manion, 54 May Road, Toorak, Victoria. A special Olympic year Nats. badge has been struck, and the site is Traralgon, 100 miles south-east from Melbourne.

1956 is "Ano Santos-Dumont" (Santos-Dumont year) in **Brazil** and prizes have been offered for the finest detailed model, and the longest duration obtained from flying replicas of the famous 14-bis and Demoiselle pioneer fliers. Aeromodelling has a sponsored boost in Rio de Janeiro, where there is an "Aeromodelodrome" for control-line at Manguinhos, next to the Aero Club of Brazil. Visiting Carriers from the United States Navy add international interest and give the local enthusiasts the opportunity of comparing notes with their North American opposites. A similar situation arises each time a U. S. Carrier arrives in Barcelona, **Spain**—we wonder if the appropriate department in Washington is aware of the goodwill extended by their Navy on these occasions. Regret to say we have no news of similar reciprocal visits by the British Navy.

More news is through on the **Argentine** Nationals, following mention of the team racing last month. A Fox 35 powered Smoothie, won aerobatics for E. Cereda, and the same model/engine combination placed second. In free flight power, a Forster 29 in an original design won first place for Rodolfo Cergol, and in ½-A, the

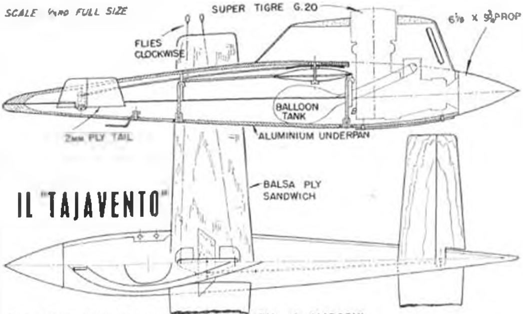
July aeromodelling cap for Dutch enthusiasts is seen at top, where the lads are preparing for the A/2 Elims. From Czecho. is a confirming picture of that ¼-scale Zlin Trainer and its 90 c.c. Menet engine. No, it doesn't fly with cockpit occupied—is control line and 15 ft. 8 in. span. Nice and very typical French-Swiss shoulder wing F.A.I. model is by Ramseier of Geneva. Bottom: David Viana and his OK 19 free-flight model at the Argentine Nats. Below: Unique fff scale old-timer by a 60-year old German modeller.

McCoy 049 diesel took both 1st and 2nd for J. Toyos and M. Leys. The latter also won the F.A.I. class with a McCoy 09 Sandy Hogan. This is most interesting, for it shows a swing to the diesel in a country where all types of engine are readily available. In Wakefield, Oscar Perera was the only man to make five max.'s, and many new names feature in the results. No representatives were sent to the Swedish finals. Perhaps the most outstanding performance was in R/C, by winner Ignacio Iriarte, who has elevator, rudder and engine control via "Citizen Ship" receiver in a high wing cabin design, like an enlarged Sky Skooter. Wings had telescopic struts, and after ROG and climb with engine control, the owner stopped the engine and went into a one minute inverted glide before recovering for an upright spot landing. When upside down, the wings struts compress to allow reversal of the dihedral, so for a moment, its an ornithopter!

The annual Nordic Championships went to **Sweden** by virtue of Gunnar Kalen and Hans Friis, taking 1st place in A 2 and Power while Johansson was 2nd in Wakefield. Erik Knudsen won the latter event for **Denmark**, and the **Finnish** team was second in the overall points. Friis also scored a leading victory in the **Saarbrucken** Cup; but full details have yet to arrive on this International.

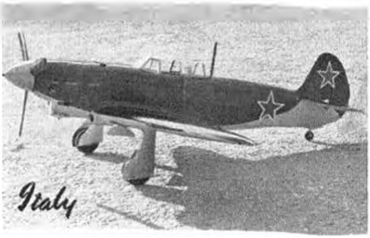
Stegmaier flew inverted "S" patterns and "8's" to win the **German** Nats. R/C event, and another Stegmaier equipped model (pneumatic) placed 2nd.

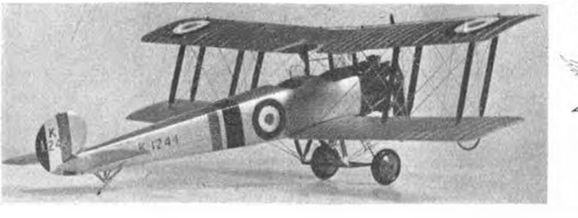
IL "TAJAVENTO"



215·5 KPH ITALIAN RECORD HOLDER BY A. MARCONI.

Deg. of Tajavento, shows the lightweight 134 m.p.h. record claimant from Italy. Swiss model belongs to Mrs. Maibach's hubby—returned a single maximum at Cranfield then withdrew. Malayan tailless is own-design by Lim Theng Choon at Ipoh, where the lads are keen on organising a club. Stunt model at right is by Tony Farnan, has an 18% thickness wing, Jap O.S. 29 engine, weighs 40 ozs. and won the Victorian State Champs. Below is nose of a beautiful 79 in. Connie, with four Webra's built in seven months by members of Treviso club near Venice. Has working u/c, flaps, lights and engine control. At left is another detailed Italian model, by Musso of Asti, this time a Yak 9 with lights and cockpit equipment.





FAMOUS BIPLANES

NUMBER 5

AVRO 504

BY C. A. G. COX

THOSE OF US WHO DREAM nostalgically of the fabric-and-wire days of aviation look back on the Avro 504 with reverent affection. Here was a machine more faithful than "Faithful Annie" and was more deserving of the nickname "Stringbag" than any subsequent aircraft; a self-propelled box kite as safe as a farm cart, romantic as a sailing ship.

The 504 enjoyed a phenomenally long life, from the prototype of 1913 through no fewer than twenty-three variations until quantity production ceased in 1931. As late as 1936 they could still be seen chugging across the skies giving joy rides or towing advertising banners. One or two examples were even flying in Greece during the second world war.

During the first war alone 8,340 machines were built by sixteen contractors in the United Kingdom and so popular was the design that it was manufactured under licence in five countries and used in ten more, ranging from the U.S.A.. to Japan. More than twenty different engines were fitted, and duties performed by the 504K included training, bombing, passenger carrying and drogue towing. The 504K was even converted for use as a single-seat fighter for home defence during the first war.

The 504N was first produced in 1922, and while retaining the basic wood and wire structure of previous marks, it differed mainly in having an improved undercarriage with oleo-pneumatic shock absorbers and no skid, and in the fitting of the Armstrong-Siddeley "Lynx" radial engine of 160, 180 or 215 h.p. instead of the rotary Le Rhone.

The Avro 504 was strong, safe and easy to fly and maintain. The 504K had a maximum speed of 75-85 m.p.h. at 10,000 feet and stalled at 43 m.p.h. It could land and take off from a very small field and this attribute, coupled with fairly low cost, contributed to its popularity as a "five-bob flip" machine during the peacetime years.

Building the model 504N

Illustrated stages are marked with an asterisk(*).

The model shown is of predominantly balsa construction, but advocates of hardwood construction could supply a convincing argument for the use of stronger material for frail undercambered wings and thin cockpit sides.

1 (*). Build up the fuselage from $\frac{3}{8}$ in. x $\frac{1}{16}$ in. sheet and complete the cockpit interiors.

2 (*). Cut the $\frac{1}{8}$ in. decking pieces and hollow the underside before cementing in place.

3. Carve and sand the fuselage to cross-section.

4 (*). Make the sanding block shown from pine or hardwood. Cut the upper wing 2 in. too long and cement it at its ends to the edge of the work bench while sanding the undersurface.

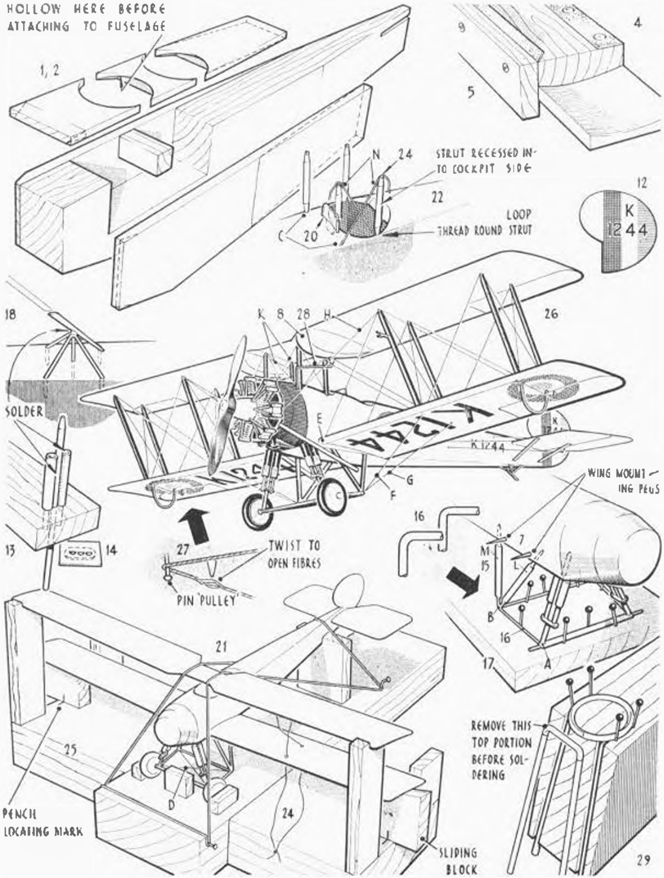
5 (*). Unscrew the side fence from the sanding tool and remove the glasspaper. Carefully detach the wing from the bench and cement it at its ends to curved block while shaping the upper surface. Cut away the unwanted portions at the centre section and tips, then gently sand these areas to shape.

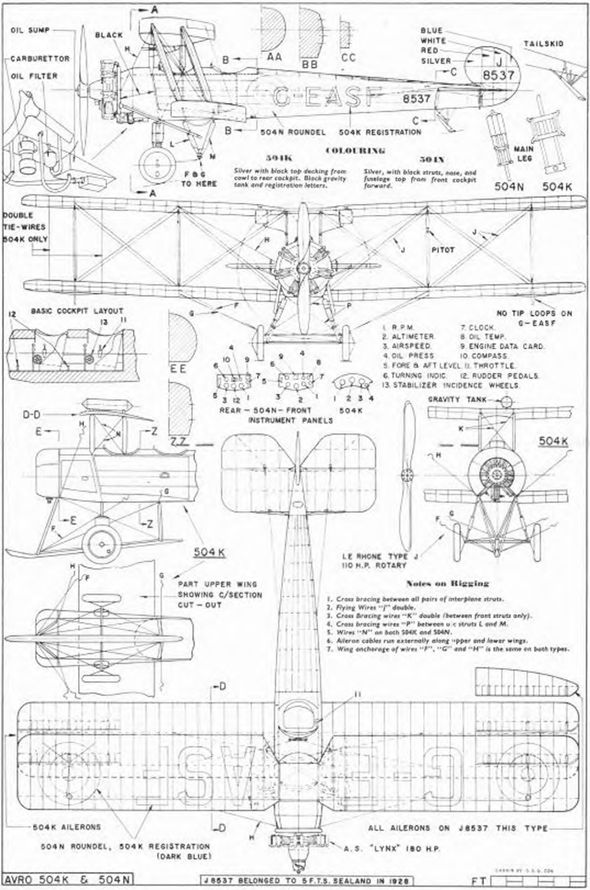
6. Repeat the process with the lower wing, separating the halves last of all.

7 (*). Fit very slender bamboo "dowels" to the fuselage and make corresponding holes in the lower wing roots.

8 (*).Make petrol tanks (sections of sanding block are ideal—they will fit perfectly). Add short lengths of very fine tubing for the sumps.

George Cox's 504N above, is decorated in Cranwell colours, sketch opposite gives underside details. Below left, a joyriding 504K with enlarged rear cockpit, operated by Border Aviation Co. in 1920/21. Was Dark Green with white panel, formerly R.A.F. machine J 755. At right is the Nash collection 504K with 130 h.p. Clerget Rotary, airframe registered H 2311. (Air Britain Photos)


HOLLOW HERE BEFORE ATTACHING TO FUSELAGE
1, 2
9
4
8
5
N
24
STRUT RECESSED INTO COCKPIT SIDE
22
12
K
1244
LOOP THREAD ROUND STRUT
C
20
18
K
8
28
H
26
E
SOLDER
K1244
G
F
WING MOUNTING PEGS
16
13
14
27
TWIST TO OPEN FIBRES
PIN 'PULLEY'
7
M
15
L
B
16
17
A
21
REMOVE THIS TOP PORTION BEFORE SOLDERING
25
D
24
PENCIL LOCATING MARK
SLIDING BLOCK
29



OIL SUMP
BLACK
CARBURETTOR
OIL FILTER
A
B
AA
BB
CC
BLUE
WHITE
RED
SILVER
C
J
8537
TAILSKID
G-EASF
8537
504N ROUNDEL
504K REGISTRATION
MAIN LEG
504N
504K
F & G TO HERE
COLOURING
504K
Silver with black top decking from cowl to rear cockpit. Black gravity tank and registration letters.
504N
Silver, with black struts, nose, and fuselage top from front cockpit forward.
DOUBLE TIE-WIRES 504K ONLY
PITOT
BASIC COCKPIT LAYOUT
NO TIP LOOPS ON G-EASF
1. R.P.M.
2. ALTIMETER.
3. AIRSPEED.
4. OIL PRESS.
5. FORE & AFT LEVEL
6. TURNING INDIC.
7. CLOCK.
8. OIL TEMP.
9. ENGINE DATA CARD.
10. COMPASS.
11. THROTTLE.
12. RUDDER PEDALS.
13. STABILIZER INCIDENCE WHEELS.
EE
REAR – 504N – FRONT
INSTRUMENT PANELS
504K
GRAVITY TANK
D-D
ZZ
504K
504K
LE RHONE TYPE J
110 H.P. ROTARY
PART UPPER WING SHOWING C/SECTION CUT-OUT
Notes on Rigging
1. Cross bracing between all pairs of interplane struts.
2. Flying Wires "J" double.
3. Cross Bracing wires "K" double (between front struts only).
4. Cross bracing wires "P" between u/c struts L and M.
5. Wires "N" on both 504K and 504N.
6. Aileron cables run externally along upper and lower wings.
7. Wing ancharage of wires "F", "G" and "H" is the same on both types.
504K AILERONS
ALL AILERONS ON J8537 THIS TYPE
504N ROUNDEL, 504K REGISTRATION (DARK BLUE)
A.S. "LYNX" 180 H.P.
AVRO 504K & 504N
J8537 BELONGED TO 5 F.T.S. SEALAND IN 1928
FT

All together boys! A Bristol built Avro 504N about to be started up offers close up detail to aid modelling. Note the rigging, rib tapes, underwing tanks and undercarriage. George Cox's model at right meets such a close comparison with full honours — except perhaps for a pair of shiny tyres!

9. Make the tail surfaces from mm. ply and score the elevator hinge line. Use a fretsaw to cut slots for the control horns.

10. Fill the grain of all the components.

11. Threads to simulate wing ribs tapes would be disproportionate in thickness. Make a thin paper "comb" (*see* Boeing F4B-4 article) and glue on to each wing. This spaces ribs automatically and locates the ailerons which may then be gently scored or cut away then replaced.

12 (*). Dope silver all surfaces except the rudder's coloured bands. These should be doped white then masked for the addition of red and blue stripes. Paint a white 8, 5 and 7 on the rudder and then superimpose the complete serial number J8537 with Indian ink. Colour the nose section black, add serials to the wing undersides, and paint roundels. (Transfers can be bought exactly the correct size, but watch the size of the red spot.)

13 (*). Make the main undercarriage leg parts from the appropriate gauge of piano wire and brass tubing, and sink them into scrap balsa while soldering.

14 (*). When making the slider links, drill the holes in sheet celluloid *before* cutting outline.

15 (*). A useful material for the axle and struts L and M is the elliptical section copper-plated wire used for strapping packing cases. (Your local ironmonger or metal dealer should be able to supply it.) This wire comes in a variety of widths and simply needs filing to circular section at the ends, then mitreing at the lower ends to fit.

16 (*). The lower frame of the undercart assembly may be made from ordinary round wire. File a sharp corner on the inside of each bend before soldering.

17 (*). Support the fuselage on a scrap block and pin the undercarriage parts in position. Solder the front joints—A first, then B. Use a needle file to remove surplus solder.

18 (*). The tailskid diagram is self explanatory. Note that the soft wire skid is trimmed to length after soldering.

19 (*). Colour the undercart silver and black, turn hardwood wheels and push them on axles.

20 (*). Make the windscreens.

21 (*). A rigging jig such as the one illustrated is essential for this model. It can be mounted on an upright post held in a vice, and can, of course, be used for other models. The cruciform shape gives maximum accessibility with rigidity, although a flat board may be used with success.

22 (*). Make all struts from bamboo and fit the centre section struts as shown. After recessing the rear ones into cockpit sides, smooth over and repaint the interior.

23. Pierce all the strut holes in the wings and mount the model in the jig, checking for alignment. Cut the inter-plane struts to fit, and in case there is any discrepancy in lengths, it is a good idea to store them in a dummy wing until needed. Pierce a hole in the inner front port strut for the pitot head and dope all struts black.

24 (*). Notch the ends of the c/section struts and glue double lengths of thread into the holes "C". Try using Coats "Terylene" Gossamer thread colour Y793. It is fine and needs no smoothing. Cross these threads "K" over and glue into the strut notches. When dry trim off the surplus.

Glue single threads, 9 in. long, at the bottom of the c/section struts, cross over and glue at the tops. These wires are labelled "N" on the plan. Do not trim them off—these wires will end at the undercarriage.

All remaining bracing wires should be 6 in. long. Glue them into the strut holes in the upper wing, pass them through the appropriate holes in the lower wing with very fine needle, and tie the ends of each pair in case they pull out accidentally.

25 (*). The model is now ready for rigging. Mount it on its jig, apply a spot of glue to the c/section strut holes and locate the upper wing. Make sure that the elastic band is not too tight, or you will suddenly find you have 90 degrees dihedral. Glue the dowels and attach the lower wings. Withdraw the tip supports to allow these wings to sag, glue both ends of the interplane struts and add to the model, positioning the inner pairs first, then the outer. Replace the wing tip supports matching the locating lines.

With the thread slack, apply a spot of glue just above the lower wing so that when pulled tight glue is drawn into the hole. (The inner flying wires are simply passed between the lower wing and the fuselage.) Leave until the glue is hard.

26 (*). Remove the model from the jig, glue threads "H" into the notches in the nose. The threads "F" and "G", loop around the bottom ends of struts "L" and "M" and cross over to form wires "P" (*see* plan). Trim off all other threads. Add cross bracing "D" to the lower undercart frame.

27 (*). Glue celluloid control horns to the ailerons and tail surface. Attach a single thread to the fuselage at "E" pass round the "pulley" and twist to open the fibres. Pass over the aileron horn and glue. Take the same thread through the ailerons with a needle, over the top control horn, round the pulley and on to the starboard side, finishing up at the fuselage opposite "E".

Repeat the process with the tail controls.

28 (*). Make petrol feed pipes from fuse wire, paint red and attach to the model.

29 (*). Construct the engine as described in previous articles. When making the exhaust system, bend the pipes to fit the model, and from this mark the grooves in the soldering jig. Cut off the centre portion before soldering. The collector ring may be wound round a conveniently-sized dowel to give a perfect circle. The completed exhaust assembly will be found to stay in place unaided when the engine is cemented to the nose. A spot of thick glue joining cylinders to collector ring is all that is needed to represent exhaust ports.

30. Carve a propeller from mahogany and give a coat of clear dope, or use balsa painted reddish brown.

31. Add bamboo stabiliser struts, wire wing tip loops and pitot head.

32. Make the carburettor, oil sump, etc., from dowel, tube and scrap balsa and the oil-line from fuse wire.

Another Way of Doing It— Reader's Suggestions

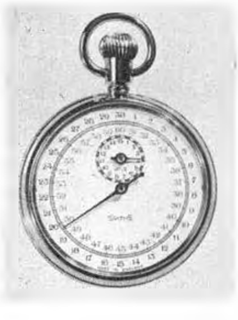
Cockpit framing.—Instead of attaching painted paper strips to the cockpit hood, H. E. Wilson of London, S.W., masks out the windows and gives the canopy two or three coats of paint. Removal of the tape leaves the framing slightly raised. Any stray paint, he points out, can be scraped off with a sharpened stick. Make sure it *is* paint though, and not dope.

Engine cylinders.—Another reader (sorry, your address has been mislaid) advocates the use of dress sequins to represent finning. Provided several sizes of sequins are available this should be worth trying, but few cylinders are cylindrical *outside* (*e.g.*, Fiat C.R.42). Incidentally, a six-way leather punch would give a choice of diameters for your own "sequins" made from card. They could then be threaded on a pin for mounting on crankcase.

From time to time space will be reserved in these columns for your ideas. If you have a pet method of reproducing a particular detail, write to us so that we may pass it on for the benefit of everyone.

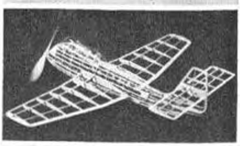
Trade Notes

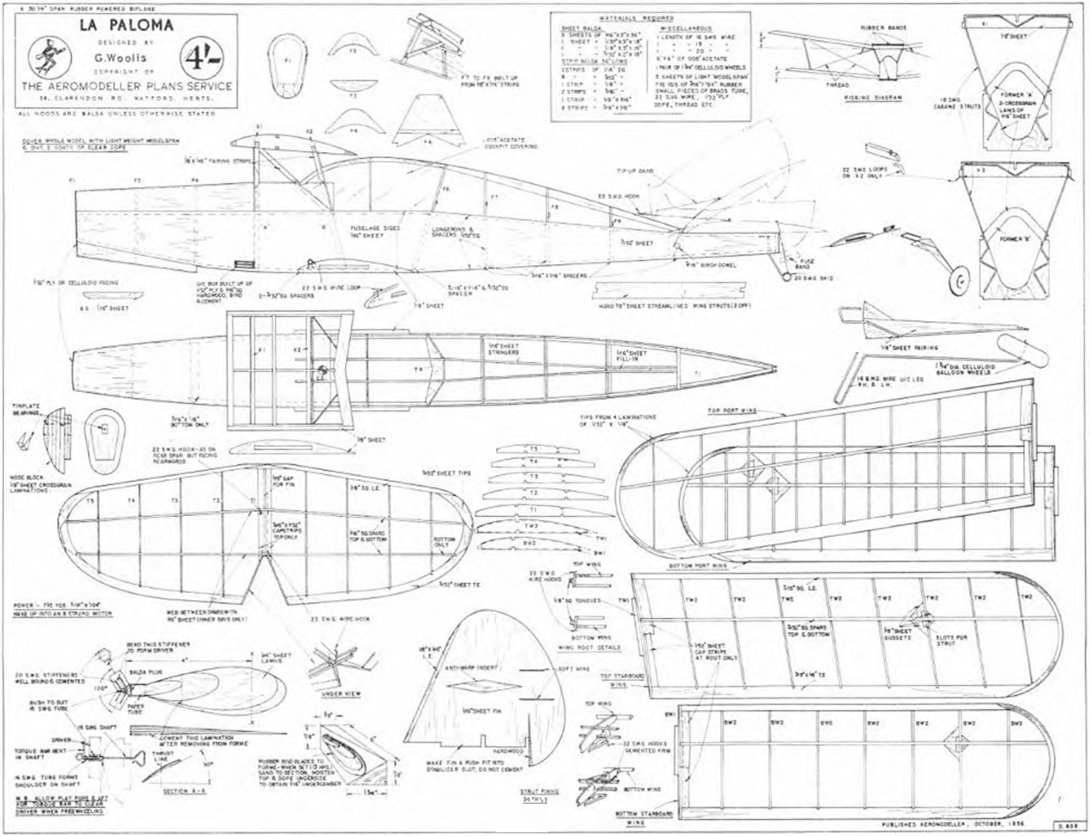
NO STOPWATCH could possibly have a higher commendation than "as used at the World Championships" and that is the claim which the **Smiths** watch can make, following this year's meeting at Cranfield. We have used this British company's product for a number of seasons and its robust 7-jewelled movement, capable of recording up to 1/100th second according to the actual type of watch, has never let us down and always been right on the dot at every check. Available with 30 secs sweep (which we prefer and illustrate) and also with 60 secs sweep, the Smiths product can be purchased from any jeweller, price range being from £6 10s. 0d. to £8 10s. 0d. This is one item that can well be afforded out of club funds!



Fuel-proof colour dopes have been somewhat elusive until now, but the **A.F.P.** product by **Hamilton Model Supplies** will bridge the gap for most modellers. We tested it under most stringent conditions, found it impervious to all commercial fuels, although those with nitro-methane content should not be allowed to soak in, and only in the case of our very special 40 per cent. nitro brew were we able to lift the colour off in a skin. Seven bright colours complete the range, in 1s. 6d. and 2s. 6d. jars. This dope should not be applied over any plastic mouldings—the result is a crackle finish!

Other review item this month is the latest **KeilKraft** scale **Seamew**, a fine model, as the photographs indicate, and at 9s., good value, although we would have liked to see transfers included—and a better fitting canopy—ours was a trifle small.





A 30 1/4" SPAN RUBBER POWERED BIPLANE
LA PALOMA
DESIGNED BY
G.Woolis
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE
38, CLARENDON RD. WATFORD, HERTS.
4/-
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
MATERIALS REQUIRED
SHEET BALSA
MISCELLANEOUS
6"X6" OF .005" ACETATE
DOPE, THREAD ETC.
RIGGING DIAGRAM
RUBBER BANDS
THREAD
18 SWG CABANE STRUTS
FORMER 'A'
FORMER 'B'
1/16" SHEET
22 SWG LOOPS ON X2 ONLY
TIP-UP DAMP
22 S.W.G. HOOK
FUSELAGE SIDES 1/16" SHEET
1/32" SHEET
3/16" BIRCH DOWEL
20 S.W.G. SKID
FUSE BAND
1/16" SHEET STRINGERS
1/16" SHEET FILL-IN
1/8" SHEET FAIRING
16 S.W.G. WIRE U/C LEG R.H. & L.H.
BALLOON WHEELS
TOP PORT WING
BOTTOM PORT WING
TINPLATE BEARINGS
NOSE BLOCK
1/32" SHEET TIPS
1/8" SQ. L.E.
BOTTOM ONLY
HARDWOOD
TOP WING
BOTTOM WING
WING ROOT DETAILS
1/8" SQ. TONGUES
1/32" SHEET TE
22 S.W.G. WIRE HOOK
UNDER VIEW
1/16" SHEET FIN
ANTI-WARP INSERT
SOFT WIRE
MAKE FIN A PUSH FIT INTO STABILIZER SLOT, DO NOT CEMENT
STRUT FIXING DETAILS
TOP STARBOARD WING
BOTTOM STARBOARD WING
BALSA PLUG
PAPER TUBE
DRIVER
SECTION X-X
THRUST LINE
CEMENT THIS LAMINATION AFTER REMOVING FROM FORME
BEND THIS STIFFENER TO FORM DRIVER
PUBLISHED AEROMODELLER, OCTOBER, 1956
D.839

A 30-inch rubber driven Biplane with many novel features, semi-scale in appearance and capable of long duration flights

La Paloma

by George Woolls

"LA PALOMA" was designed in an attempt to combine realism with good flying ability. With due modesty, we think we have achieved our object. The wing struts and bracing wires fulfil their proper functions in retaining the wings to the fuselage and yet permit a high degree of "knock-off-ability".

The construction in general follows quite closely to that used in "Estrellita" (AEROMODELLER, January, 1956), and we would recommend a novice to build that little low wing before tackling the biplane presented here. Incidentally, the propeller blades used on these two aeroplanes are identical.

Use the best quality straight grained balsa throughout (quarter grained for ribs if you can get it), of medium light weight unless otherwise stated on the plan.

Construction is quite straightforward and should be clear from the plan and the only possible source of trouble should be the centre section of the top wing. However, if particular attention is paid to the sequence of events in the assembly of this part of the aeroplane, and things are taken steadily, no bother should occur.

Build the centre section on the plan with Leading Edge, Trailing Edge, $\frac{3}{32}$ in. square spars, and Ribs. Cut and fit, **but do not cement,** the $\frac{1}{8}$ in. sheet strut attachment spars marked "X". Make these parts a really good fit and chamfer top and bottoms to suit rib contour.

Cut the fuselage formers A and B from two thicknesses of $\frac{1}{16}$ in. sheet cemented together with crossing grain as shown. Bend the 18 s.w.g. wire struts to the shapes shown ensuring that they lie dead flat on the table, to avoid distortion on assembly. Pin spars X and the fuselage formers down on to the plan, and cement the wire struts to join both pieces. Add the 22 s.w.g. wire bracing anchors to the Rear "X" spar. When the cement has dried sew the wire to the balsa with a needle and strong cotton and again thoroughly cement.

Now the Fuselage can be assembled, starting by cementing Formers A and B to the sides, in the correct positions. Before finally cementing the centre-section to the struts, add the $\frac{1}{8}$ in. sheet slotted ribs, and cement the $\frac{1}{8}$ in. sq. tongues to the wing panels and line these three items up on a flat surface. Now the centre section may be cemented to spars X and the whole assembly should be true and at the proper angle of incidence (4°).

A careful study of the plan should make all the other constructional details quite clear. Cover the entire aeroplane with lightweight tissue, dope with well thinned clear dope to which has been added a little castor oil. Fuselage of the original aeroplane was dark blue (natural tissue) and the wings white, finally doped silver.

Rigging and Flying

The upper wings are retained by means of rubber bands across the centre section, and thread bracing (flying wires) adjusted in length to give the correct dihedral. The lower wings are held by means of an elastic band tensioned thread bracing (landing wires) and the interplane struts which are adjusted in length to give the correct dihedral.

Rubber bands connecting the upper and lower wings across the fuselage are not strictly required, but are used just to be on the safe side.

We claim that 75 per cent. of the trimming is done in the building, for it is our contention that if any conventional aeroplane is properly and accurately built to the plan, is free of warps, and balances where shown, it will fly safely on low power. So, assemble the aeroplane. Prewind, pretension and insert the motor, and check that the aircraft balances level when supported where marked C.G. on the plan. Check by eye and measurement that the wings, tail and rudder are unwarped and agree with the rigging diagram. Rather than trying to hand glide, put on 50 to 60 hand turns and gently launch into any gentle wind there may be blowing.

If the ground sports a cricket pitch let the initial test be R.O.G., but don't use more than 70 turns for a start.

The original prototype turned in a perfect flight R.O.G. on 70 turns "right off the board", but all too soon ended a flight some 60 feet up in a tree after hooking a light thermal. So don't be fooled into thinking that the struts, bracing, etc., set up so much drag that soaring is impossible. Remember that there is some 200 sq. in. of mainplane surface, giving a very low wing loading (about $2\frac{1}{2}$ oz. per 100 sq. in.), so——use that D/T!

NAFTALI KADMON gives a clue on how to

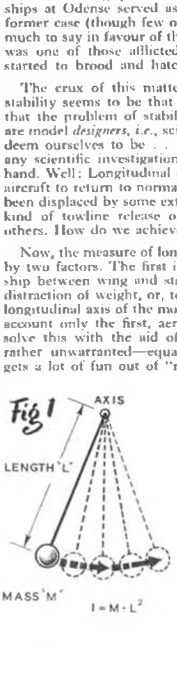
Curb that Stall

Long or short nose for your next glider? This article explains the why's and wherefore's of nose length and inertia

NUMEROUS MODELLERS have come up against the question of how to design a model with adequate longitudinal stability, adequate, that is, for a given purpose. Some models designed for more-or-less still-air flying, and known to be excellent performers under these conditions, simply leap from stall to stall in spite of repeated trimming, when flown in a competition in which the meteorologist—or the weather gods—did not co-operate. On the other hand, models designed for rough weather are not the best dead-air performers when it comes to clipping that odd half-inch per second from the sinking speed. The 1954 A/2 World Championships at Odense served as an excellent example of the former case (though few of the competitors would have much to say in favour of the weather there!). The writer was one of those afflicted, and upon returning home started to brood and hatch, figuratively speaking.

The crux of this matter of inadequate longitudinal stability seems to be that model designers often forget that the problem of stability has two sides. But as we are model *designers*, *i.e.*, scientifically-minded (or at least deem ourselves to be . . .), let us start as required in any scientific investigation by defining the problem at hand. Well: Longitudinal stability is the property of an aircraft to return to normal flight conditions after it has been displaced by some external force, *e.g.*, a gust or the kind of towline release one only sees perpetrated by others. How do we achieve this stability?

Now, the measure of longitudinal stability is governed by two factors. The first is the aerodynamical relationship between wing and stabiliser, and the second—the distraction of weight, or, to be exact, of mass, along the longitudinal axis of the model. Most modellers take into account only the first, aerodynamical, part, and try to solve this with the aid of a multitude of—sometimes rather unwarranted—equations. Personally, the writer gets a lot of fun out of "mathematical" designing, but he knows quite well that owing to the shaky basis on which these calculations are built (which in themselves may be completely correct) and which results from an almost total lack of exact experimental aerodynamical data for low Reynolds Numbers (meaning low speeds and small dimensions), and especially for the modern model airfoil sections, behaviour of a model can only in very few cases be correctly forecast.



Well, as we were saying, a lot of paper work goes into the aerodynamical wing/stabiliser relationship. In this article, however, let us briefly review the second factor affecting longitudinal stability. You will presently see that a very definite trend will evolve out of these contemplations which will enable us to design more stable models with a minimum of additional calculations.

What is Inertia?

Please do not feel offended if I ask you whether you have ever heard of the moment of inertia. For those who are not ashamed to admit that they haven't, here goes. Take a pendulum of length (l), suspended at one end, with a mass (m) attached to its other end. If the pendulum is in a swinging motion you will feel a certain resistance on trying to stop it. This resistance to a change in motion of a body rotating or oscillating round an axis is called its moment of inertia, and is designated (I). The larger it is the more persevering will the pendulum be in its oscillations. If you double the mass (m) the moment of inertia, too, will be doubled. But if you now leave the mass (m) as it was and double the length (l) instead, the moment of inertia will grow four times! If you treble the length (l) will grow to nine times its original value. From this we infer that the formula of the moment of inertia of a body of the type just shown (*Fig.* 1) is

$$I = ml^2$$

Let us now halve (l), but on the other hand double (m). This leaves the balancing or turning moment (M), which is simply defined as force or weight times length of lever, as it was. Nevertheless, the moment of inertia will be halved, because for I_2, the new moment of inertia, we now have

$$I_2 = 2m\left(\frac{l}{2}\right)^2 = \frac{ml^2}{2} = \frac{I_1}{2}$$

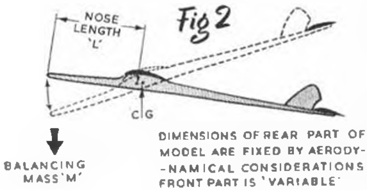
If the mass is distributed along the pendulum, not concentrated at one point, then the formula for the moment of inertia will be

$$I = \int_0^l l^2 \times dm$$

as your physics master (if you still have one) will verify for you—I doubt that the Editor can spare the space to do it here.

Inertia on the model

Now let's turn to our model. This can be considered (*Fig.* 2) as a horizontal pendulum oscillating up and down around the centre of gravity when disturbed in a manner mentioned above, and having some mass (m) in the nose in order to balance those parts of the model



which find themselves behind the c.c., *e.g.*, the rear fuselage and the tail. This rear part of the model has been fixed by aerodynamical considerations (stabiliser area, airfoil and angle of incidence), and therefore has a certain fixed turning moment easily calculated, even by those of us who do not consider themselves intellectual offsprings of Pythagoras or Newton, by multiplying the weight of each component by the distance of its own c.g. from the c.g. of the complete model, and adding up. This fixed tail moment has to be balanced by an equal and opposite moment in the nose—that is, if you are fond of your model. And now comes the crucial question. On the one hand we can construct a long nose, a small weight on whose tip will balance the model, resulting in a model of low total weight. On the other hand we can use a short moment arm but slap on to (or into) it a lot of lead. What, then, is to be preferred for our model?

Choosing nose length

If we disregard the weight of the nose structure in order to leave the integral calculus out of the game and simplify the calculations (did I hear some weight—ing—falling off somebody's chest?) we can answer this question quite easily. As we saw before, long nose arm + small weight = high moment of inertia = low stability. But short arm + large weight = same balancing moment but low moment of inertia = high stability. All this comes only because inertia (I) is affected directly by the mass (m), but by the *square* of the length (*l*) of the arm, *i.e.*, by l^2. If we are considering a glider, then before deciding what kind of nose to choose (this sounds like cosmetical surgery!) we have to decide whether we wish to build a high-performance still-air model—as is done extensively on the Continent, especially in Austria, Yugoslavia, Germany and Switzerland, or an all-weather one. Each has its own merits, but limited field of application. So let's consider the following.

Additional stability is generally achieved at the expense of sinking speed. This is true not only of longitudinal, but also of lateral stability, where addition of dihedral for a given projected area increases the actual area, and therefore the drag. If we want a stable model we must give away some still-air performance, though this may pay handsome dividends in rough weather.

For the still-air model we can use a long nose, thereby reducing ballast weight. But for the stable all-weather model we need a short nose with more weight to reduce the inertial moment. We'll calculate two cases for an A/2 Nordic glider. If the tail moment is 42 in./oz. we can obtain the required nose moment either by building a nose 21 in. long, with 2 oz. of ballast at its tip, or by building one of 14 in. length, with 3 oz. of ballast (disregarding, as we said above, the weight of the fuselage front section). The difference will be found in the moment of inertia. If I_1 is that of the long-nose case and I_2 of the short-nose one, then

$$\frac{I_1}{I_2} = \frac{2\times 21^2}{3\times 14^2} = \frac{882}{588}$$

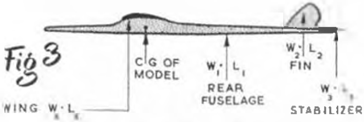
the reduction, attained at the cost of one additional ounce of weight, being considerable (33 per cent.). The lightest model will be obtained by putting, on the appropriately long nose arm, only the weight necessary to make up the required total weight, *i.e.*, 410 grams or 14·46 oz. for Nordic models (1 oz. = 28·35 grams). This model, however, will have the maximum of inertia. The shorter we make the nose moment arm the greater the balancing weight necessary, but the smaller the inertial moment—down to a lower limit after which it rises again owing to the excessive weight. Of course, nobody is willing to put up with a trimming weight of 50 oz.—stability or no. The optimum of weight and inertia will be found somewhere between the extreme points and the calculus gives us a relatively simple and satisfactory numerical answer, even if we take the nose structure into account, but we must leave this outside this article.

However, as practical modellers we must bear in mind an inherent contradiction. Rough-weather models need a lot of strength notwithstanding their stability, and strength means weight—or added inertia—which reduces the much-wanted stability. The still-air model, on the other hand, needs little strength, *i.e.*, little weight, and therefore has stability to spare—which it does not need! This seems to indicate that it is more difficult to design and build a model which will be really successful under rough-air conditions.

Conclusions

We now come to the conclusions. These we shall divide in two: (*a*) In the design stage: models designed for longitudinal stability must be constructed as lightly as possible. This applies particularly to empennages and rear fuselage. Tail moments have to be kept down as far as is compatible with aerodynamic requirements. Nose length will be reduced as much as possible, even at the cost of some added total weight.

(*b*) In the "conversion" stage (by this I mean the conversion of an old-rule Wakefield to a present-rule one, or of a lightweight glider to F.A.I. specifications, etc.) if the forward portion of the fuselage is fixed in design, *e.g.*, on rubber or power models, it is most advantageous from a stability point of view to add all additional weight at the c.g. not as strengthening of the airframe, as this leaves the moment of inertia nearly unchanged (otherwise it would grow). But on a glider it is best to shorten the nose (or put the weight box back) and add all additional weight as balance and perhaps as strengthening of the nose. This will result in reduced inertia, and therefore enhanced stability. Get out of those stalls!



$$M = W_1 \cdot L_1 + W_2 \cdot L_2 + W_3 \cdot L_3 - W_4 \cdot L_4$$

Calculating the turning moment M_1 of the rear part of the model. W_1 and l_1 are best found through experience with previous models

The balancing moment M_2 of the nose must be equal and opposite to M_1, but its length of arm must be such that its moment of inertia $I = ml^2$ will remain as small as possible, providing weight remains reasonable

R.A.F. GEN

Bruce Fergusson explains the origin of the R.A.F. Ceremonial Swords

FOR HUNDREDS OF YEARS rank has been denoted by the wearing of a sword. There was, however, a great public outcry when an R.A.F. Sword was mooted. It stood to reason that all officers should continue to wear swords when the Service was formed as, indeed, they had done in the Royal Navy and the Army.

The R.A.F. Sword, designed for wear with Full Dress, followed the Naval style, and was formally approved by H.M. King George V in July, 1918. It has an elaborately mounted eagle hilt, a white fish-skin grip and a blue and gold knot.

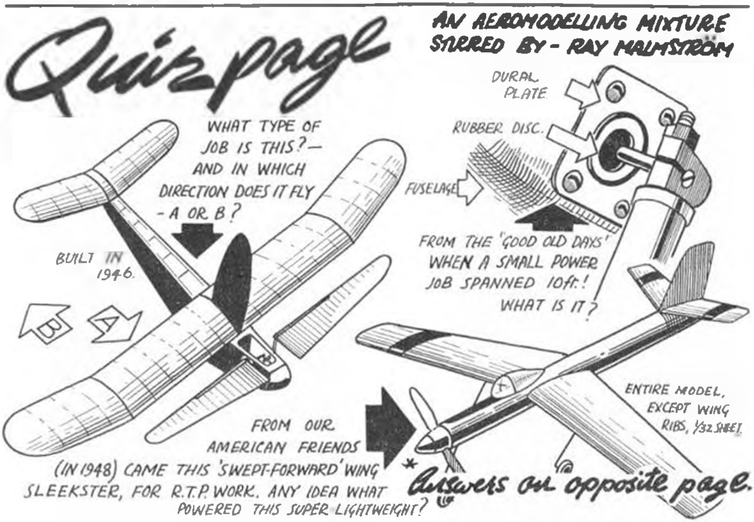
Although there is only one design for the sword, there are two types of scabbard—a decorated type for those officers of Air Rank and a plain one for those below.

It was during Mr. (now Sir) Winston Churchill's term as Secretary of State for Air, from 1918-1921, that he was asked why officers of the Royal Air Force should want to carry swords. The questioner received, by way of answer, a typical Churchillian quip, "To kill the eagles when they meet them in the air."

In spite of the fact that Full Dress is no longer worn, swords are still carried on ceremonial occasions and at all times when worn by officers of the other two Services, but now they are worn with Service dress.

A Sword of Honour has, since the formation of the Royal Air Force College at Cranwell in 1921, been presented to the best all-round Officer Cadet in the Flight passing-out. The first recipient was Flight Cadet Under Officer (now Group Captain) C. L. Falconer. The first National Serviceman passing-out from the R.A.F. Officer Cadet Training Unit at Spitalgate to receive such an award was Officer Cadet (A.C.2) D. E. Turner.

Officer Cadets of the Women's Royal Air Force are awarded a Sash of Honour, instead of a Sword of Honour. The best all-round Officer Cadet to receive this elaborate ribbon, in R.A.F. colours, with the R.A.F. badge, worn like one of the Orders of Chivalry from the right shoulder and fastened at the left hip, receives it at the Passing-out Parade and wears it only at that Parade. The recipient never wears it again, but it is a treasured trophy of her O.C.T.U. days and to earn it is sufficient honour.



Conducted by
The Editor

RADIO CONTROL NOTES

GENTLEMAN HURLING radio model into the air alongside our title is Bud Kosby from California, U.S.A. Bud says the model is "disgustingly functional" and rejoices in the name of "Slope Face". It does, however, perform very satisfactorily with Mini-mac Radio and Arden 09 fitted with clapper type choke which operates on one of the neutral control positions.

Outstanding news from Bud's side of the water is announcement from well-known R/C firm Babcock Models Inc., that they have completely transistorised 465 megacycle equipment on the market. Tone modulation with tuned filters which obviate tuning adjustment and which enable two modulated tones to be used independently or simultaneously, are some of the features mentioned. Two types of receiver are available—a single channel set which sells at approximately £13 and a two channel receiver selling at £23. The transmitter also costs over the twenty pound mark which adds up to fairly expensive radio flying even for our American friends. There is no doubt, however that the commercial production of this equipment, which, incidentally, is interference free and weighs between 8 and 10 ounces complete according to type of receiver, is a great step forward in the world of radio control.

Twin needle valves

Readers may remember the "Go-jet" an American accessory in the form of a small needle valve assembly supplied with self tapping screw. Reader John Toomer, also from California, has sent sketches, *see Fig.* 1, showing how a single feed engine can be converted for two speed operation. The old spray bar is taken out and the holes tapped with screw provided, the two "Go-jets" are then screwed in as shown. This scheme is used extensively by local radio fliers with great success. We hope that some enterprising accessory manufacturer will produce a counterpart of the "Go-jet" for the British market; meantime, it must be left to enthusiasts to make up their own.

The Hill Receiver

One or two constructors have encountered difficulties with their Hill Receivers so we have asked Mr. Hill to give a few hints and tips on "trouble shooting" based on receivers examined—coupled with additional data obtained since the article was published. Over then to Mr. Hill:

"Little trouble has been experienced with the 27 Mc/s components (R.F.C. C_4, C_{14}, C_1, R_1 and L_1), but a high standing current which fails to drop—even with the trimmer fully out—has caused one or two headaches!

"This is due to the lack of rectified quench output to bias the second valve beyond cut-off.

"In all the receivers examined this has been the result of shorted turns on the quench coil (due to using old wire, or careless winding) or faulty diodes. Before suspecting the quench coil *check the diodes*.

"The actual type of germanium diodes used is not at all critical, but of course they must be functioning correctly. A perfectly good one can be rapidly damaged by excessive heat from a soldering iron.

"The writer has found that a miniature *selenium* voltage doubler rectified (Centrecell type D3 2 (Y) is ideally suited to the receiver.

"It is only ¼ in. x ¼ in. replaced *both* germanium diodes, and is more robust from both the mechanical and electrical point of view. However, its use may result in a standing current in excess of ·3mA—this being due to the improved reverse resistance of this unit. Should this occur, all that is necessary is to reduce the value of R.4 until the correct no-signal current is obtained. 3V4 valves were used in the original receiver because they were obtainable surplus. However, DL96 valves are now obtainable from the same sources and can be interchanged with the 3V4s without circuit modification.

"The total filament current is thereby reduced

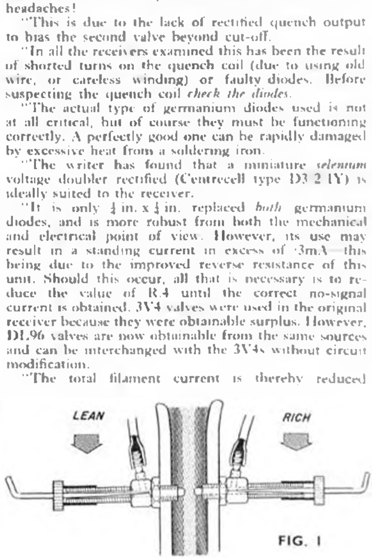


FIG. 1

QUIZPAGE ANSWERS

1. The Canard Ornithopter illustrated flies in the direction of arrow B and was built in 1946.
2. Accessory illustrated featured a rubber disc set in a dural plate which acted as a shock absorber for the undercarriage strut. A very necessary refinement for the heavy shocks these early power jobs had to withstand.
3. This fascinating R.T.P. job had a tiny electric motor built into the nose, whcih was fed by lines up through the head of the pole from a static battery.

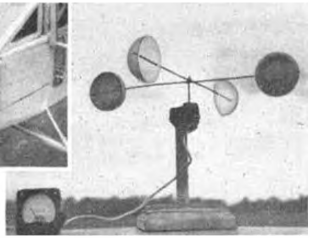
50 per cent. to 100ma at the expense of only a slight reduction in the upward swing when a signal is received.

"Towards miniaturisation and even lower heater consumption, the writer has found that a DL66 deaf-aid valve is perfectly satisfactory without *circuit* modification for the *first* stage, which will enable the more knowledgeable constructor to produce a smaller version of the original receiver.

"The writer cannot conclude without a word or two on soldering, as dry joints and overheated components are *still* a source of trouble.

"All plated parts such as solder tags and valve bases should be cleaned *and tinned* before wiring is commenced. This prevents the prolonged use of the soldering iron when the components are wired in and enable the solder to flow—an essential to good soldering.

"A 60/40 or 50/50 tin/lead alloy resin-cored solder is recommended augmented by resin flux if required. Killed acid flux should not be used in any form for radio work. Lastly a fairly hot soldering iron with a pencil bit, tinned and kept in a clean condition should result in a first class job."



Above, Col. H. J. Taplin's twin cylinder diesel which ran very well at the I.R.C.M.S. meeting. At right is Webster's anemometer made from a Mighty Midget motor, milliameter and a baby's rattle

I.R.C.M.S. Contest

Held at Wellesbourne Mountford on Suday, August 5, this "international" attracted 19 home competitors, 13 of whom recorded scores. It is interesting to note that four out of the five top place men were members of the team that won their way into the Belgian contest. Two flights were allowed each competitor with a total permitted flying time of 15 minutes, and an interval of five minutes between flights if desired. Points were awarded for the following manoeuvres: Take-off, flying a triangular course in either left-handed or right-handed direction, left and right turns, figure-eights, spiral dive, loops, engine speed control, target landing and elegance of landing, and up to four special manoeuvres. Single channel competitors were given a bonus of 10 per cent. and only one attempt per manoeuvre was permitted.

Weather conditions throughout the event were good, although it was raining slightly when the contest started. A. Jones with a scaled-up five-foot span "Sparky" kicked off, but control was soon lost and the model made two wide circuits of the aerodrome under the power of its E.D. 3·46 and finally went O.O.S. S. Parkinson made a very good take-off with his R6-B fitted with a tricycle undercarriage. Also noticeable in the undercarriage line was R. S. Higham's "Live Wire" fitted with a McCullough type four wheel truck assembly which gave excellent take-off and landing characteristics which no doubt helped this competitor to place second. Colonel Taplin suffered from his usual radio troubles and was by no means alone in this respect, although everyone was disappointed on this occasion as they hoped to see his twin cylinder in-line diesel actually in flight. Best crash of the day was credited to J. Muhurin of the American Forces who is stationed at Ruislip, and who earned a consolation prize as a result. His transistorised receiver was not at fault as it operated perfectly after the flight in a glider flown by Alex McDonald. R. Webster broke his recent run of bad luck and flew well into first place. He used his own reed equipment (described in this feature last year) in a modified "Radio Queen". Result of the contest are given in "Club News".

That relay report

Following Howard Boys' comments in our last issue regarding the A30 Relay we have received the following letter from the manufacturers.

Dear Sir,

As manufacturers of the Ripmax Marine Accessories type A.30 Relay, we are somewhat amazed at Mr. Howard Boys' so-called test and report on our product. We have read our copy of this test in the September AEROMODELLER *in both the normal and inverted position: we have also tried reading it backwards, lying on alternate sides. Having completely exhausted our imagination, we have yet to find a position which reveals any connection between that which has been written and a test of the A.30 Relay.*

The only conclusions which we have been able to draw from this somewhat biased and obviously assumptive review are (1) *that Mr. Boys has likes and dislikes;* (2) *that Mr. Boys owns and adjusts relays with a barge pole (ten foot type?); and* (3) *that Mr. Boys does not know how to test this relay properly.*

To rectify this situation, and for his future reference, we reproduce herewith a comprehensive test of this relay as conducted by Messrs. Warring and Hook. These two gentlemen are no doubt well known to Mr. Boys and we feel sure that he has the greatest respect for their integrity, knowledge and ability, and will confirm that they are fully qualified to conduct such a test.

Comprehensive test

By R. H. WARRING and E. J. HOOK

Ripmax Marine Accessories A30 Relay

Of conventional type, with single coil, and spring-loaded armature operating single pole change over contacts. The armature is not mass balanced causing some variation in "pull in" and "drop out" currents dependent upon attitude of mounting. An unusual feature is the bright plating of all metal parts except coil core and contacts. Construction is sound and should ensure stability of settings.

SIZE: 1¾ in. long x 1¼ in. high x 1 in. wide. WEIGHT: 0·9 oz

COIL RESISTANCE: 4,500 ohms at 23° C. COIL WIRE GAUGE 47 s.w.g.

CONTACTS: Domed head silver composite in 6 BA cheese head screws. A heavy cheese head silver rivet is fitted to the armature. Contact screws are a tight smooth fit and adjustment is easily effected by a screwdriver.

Rating: 12 volt D.C. at 1 amp. Non-inductive load with R.C. quench on contacts.

250 volt A.C. at 0·5 amp.

WARNING: Armature contact directly connected to frame. Suitable precautions must be taken when mounting.

OPERATING CHARACTERISTICS

De-energised, the relay was set as follows:

Gap over pole piece ... ·004 in. Gap between contacts ... ·004 in.

Contact pressure 6 g.

Relay Armature Position

	Vertical contacts lowermost	*Horizontal coil lowermost*	*Horizontal coil uppermost*
* PULL IN	2·65 m/a	2·4 m/a	2·6 m/a
* DROP OUT ...	2·4 m/a	2·1 m/a	2·25 m/a

* Defined as the point where the opposite contact is made.

Contact Pressure: With 3·4 m/a flowing through coil 5 g.

At above settings with 3·4 m/a current accelerations up to 7 g. are permissible without causing false operation of external circuit.

Shock Resistance: Approx. 7 g per m/a above "pull in" current with above settings of ·004 in.

Minimum usable operating conditions are likely to vary widely, but it is relatively easy to set the relay to give the following:

"Pull in"	... 1 m/a	Contact Gap	·001 in.
"Drop out"	... 0·6 m/a	Contact pressure de-energised	3 g.

With this setting a safe top current would be 1·5–2·0 m/a.

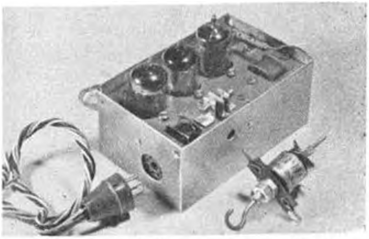
GENERAL OBSERVATIONS.—The use of a longer, smaller diameter coil would have increased the magnetic efficiency at the expense of mounted height. Since most users prefer compact relays it is doubtful whether slightly increased efficiency would compensate for less convenient dimensions. Capable of giving a change differential of 0·15 m/a at 2 m/a mean coil current, the relay is very easily adjusted and shows remarkably good shock resistance for its type. Strongly and attractively boxed, and retailing at 18s. 6d. it represents extremely good value for money.

As can be seen, there are many aspects of testing a relay which Mr. Boys has overlooked. Size, weight, resistance, contact area, contact pressure, contact capacity, speed of operation, magnetic efficiency, ease of adjustment, type of construction, materials used, finish obtained, presentation and last but not least, price, are all far less important to Mr. Boys than the ability of a relay to give identical performance in both the upright and inverted position. The writer, who has watched Mr. Boys' progression (or digression) in the radio control flying of models over a number of years, has yet to see him fly a model in the inverted position other than involuntarily!

However, the answer to this inverted flying question is very simple, and we are surprised that Mr. Boys did not know it. The relay, of course, should be mounted with the armature in a vertical position with the core of the bobbin at right angles to the line of flight. This mounting position is generally accepted as the best for all *types of relay, as it minimises the effects of gravity, vibration and landing or take-off shocks. Mounted in this position with normal rubber suspension, we defy Mr. Boys to make an A.30 chatter even using square wooden wheels on a model, provided that the normal working conditions of 1mA in excess of the make point exist. We can but feel, therefore, that the misleading readings taken by Mr. Boys were a waste of his time as they bear no relation to actual operating conditions. The only thing they do make clear is that he does not know how to adjust a relay, despite the fact that the A.30 is quite the most easily adjusted relay in production at present.*

Another and rather amusing aspect of this matter is that Mr. Boys has always been a staunch advocate and pioneer of the constant waggling rudder system. For years during which clockwork, two pawl, four pawl and ruddervator types of escapement in turn won the day, Mr. Boys was always to be seen waggling his rudder come wind or rain. In this type of control the relay is being constantly vibrated from side to side, and if what Mr. Boys says is true, then he could not do better than fit an A.30 himself as it would be ideal in this particular application, where a bit of chatter doesn't matter at all. Shame on you Sir!

In fact, whilst the A.30 relay is not prone to vibratory tendencies of this sort, it will faithfully follow up to 50 c.p.s. and is therefore in its glory in a mark space ratio set-up, as well as being ideal for all normal types of escapement.



E. Kreulen's (Holland) latest receiver is 3 valve, modified from an Honnest-Redlich circuit. Has so-called positive feed back, 3 m/A rise from zero. Range is 5 kilometres on test, 2 watt Tx. Valves, DC90, ITH, and DL92. Transmitter must be tone modulated. Typhoon escapement in foreground. Below, Jan Hackhe, first Danish radio control champion

Parkinson's tricycle undercarriaged R-6B with ED 3.46 Hunter diesel being made ready for its flight in the I.R.C.M.S. contest. At right: R. J. Webster of Kenilworth cranks up his Queen type design which has an ample prop clearance with that stilty u/c

In conclusion, we confirm that we are proud of the A.30 relay, which is the first of many new lines, and trust that we have herewith been successful in clarifying, and to some extent amplifying, the inverted (or should we say perverted) viewpoint as expressed by Mr. Boys.

Yours faithfully,

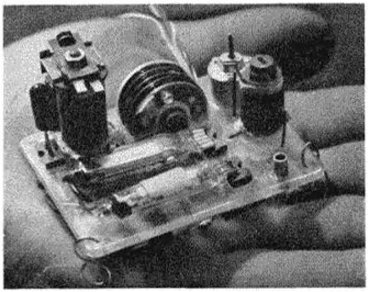
(M. A. L. Coote)

RIPMAX MARINE ACCESSORIES.

A useful point in the above letter concerns the correct mounting of relays to ensure the minimum of vibratory effects on the armature. Mr. Coote quite rightly states that all relays should be mounted with the armature in a vertical position. A relay with a balanced armature should, of course, be capable of being mounted in any position without variance in its operating conditions. The careful modeller will, nevertheless, still mount it with armature in a vertical position. In the case of relays with unbalanced armatures such as the A.30, the E.C.C. 5A, and surplus types such as the Siemens reed relay, then it is essential to mount the unit so that the armature is in the vertical position.

We now come to the question as to whether the armature should be mounted as per Mr. Coote, *i.e.*, with the armature facing sideways and the core of the coil at right angles to the line of flight, or with the armature facing fore and aft, the core of the coil parallel to the line of flight.

"Windy" Kreulen of Holland favours the latter method as the armature is less susceptible to vibration in this position. On the basis that the vibratory period on a fuselage is not only in a vertical plane, *i.e.*, up and down, but also in a lateral plane due to the offset of the engine crankpin, then Mr. Kreulen would appear to have something. A further point to be taken into consideration would be to ensure that the rear relay contact is the "rudder neutral" one, otherwise the jerk from a sudden hand launch might cause full rudder!



Tiny hand-held receiver by Arne Friberg of Sweden. Note novel Trolitul panel, spot welded solder tags and valve holders, etc. Receiver is for a powered glider

What's the answer!

Norman never did seem to have much luck with radio models although he has always been pretty good with free flight power. The trouble—according to Norman—was simply that no relay he could find would stand up to motor vibration, whatever method of suspension he used for the receiver. And as he pointed out he always used carefully balanced propellers. But other people fly radio models without that sort of trouble, so what's the answer?

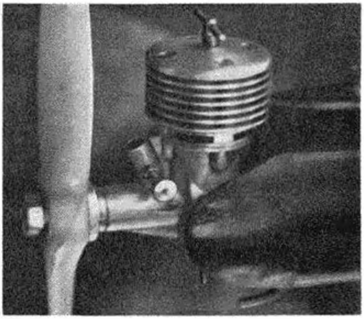
You gotta attend to it, Doc—it's an unbalanced motor!

What would YOU do in a case like this? Think a moment, then twist the page for one solution to the problem which is printed below:

ANSWER: There could be a lot of reasons for Norman's trouble, starting with adjustment of the relay itself. Assuming that the radio side is O.K.—and all relays operating on 2·5 milliamps or less virtually demand some form of shock-absorbing suspension—then the engine must be the source of the trouble. A balanced propeller does not necessarily produce vibration-free running. All single-cylinder engines are inherently unbalanced and generally give smoothest running with an *unbalanced* propeller, with the heaviest blade positioned opposite to the piston. A lot of engines, too, have certain critical speeds at which they tend to vibrate more than at other speeds. Using a different size of propeller will often cure this sort of trouble

Know Your Engine

PART 7 EXPLAINS THE MANUFACTURING FITS AND TOLERANCE REQUIREMENTS



Do you recognise this engine? It's a popular combat model power-plant in at least one country, has been modified here. Answer will be found at foot of next page

SINCE IT is a practical impossibility to produce any machine parts to absolutely *exact* dimensions, it is necessary in manufacture to specify limits of permissible differences or tolerances corresponding to the margin of error which is permissible to give the required degree of practical uniformity. Such tolerances will vary according to the class of work, and the capabilities of the machinery used to manufacture the parts. The skilled individual with fine equipment can work to much finer or closer tolerances on a "one off" job than the normal machine operator on a mass production line. Yet commercial engines have, of necessity, to be tackled as a mass production item to keep the price within reasonable limits. The result of a particular manufacturer's solution is largely passed on to the customer either as a definite characteristic of a particular engine or can be responsible for a considerable difference in performance and handling qualities between individual specimens of a certain engine design.

With first rate machines and a competent operator a practical tolerance figure for turned work is about plus or minus ·002 in. Boring can be held to about the same limits. Drilled holes (or bored) followed by reaming can be held to plus or minus ·0002 ins. although a normal reaming limit is about ·0005. On castings, machining allowances of the order of ·030 to ·040 usually have to be allowed for on gravity castings in light alloys, whilst with good quality pressure die castings where the molten metal is forced under pressure into metal dies this is reduced to about ·005 in. and in some cases nil.

It is now interesting to compare these practical tolerances for *production* against the sort of limits which can be accepted for satisfactory model engine performance on mating parts. The *fit* between mating parts is simply the amount of play or interference between them when they are assembled together. There are three general classes of fits in engineering—clearance fits where there is a positive allowance between the largest possible shaft or sliding member and the smallest possible hole or bore; interference fits where the smallest shaft is smaller than the largest bore; and transition fits where the production tolerances may produce either clearance or interference fits between any two mating components selected at random.

The mating fits we are most closely concerned with in model engine manufacture are the crankshaft-main bearing and piston-cylinder assemblies. These are the main generators of friction which to a large extent govern the power output of the engine. The big and little end bearings on the connecting rod (and the timing disc in the case of crankcase rotary valve engines) contribute negligible friction by comparison.

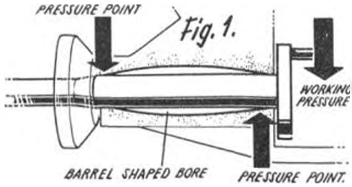
Considering the main bearing first as the simpler of the two cases, virtually the sole purpose of this bearing is to provide alignment of and support for the crankshaft. The degree of friction or braking effect it produces in so doing will be dependent on the mating materials, the fit, lubrication, r.p.m. and load—and also the surface finish of the shaft and bearing in the case of plain bearings.

The choice of materials is important since this governs the frictional *rate* or coefficient of friction, and also the wear. The general rule is that similar metals in contact generate high friction and high rate of wear (such as the same metals in contact, or two hard or two soft surfaces in rubbing contact). The crankshaft is invariably of steel, usually hardened, and so the bearing surface with a plain bearing is best relatively soft. It has been found, in fact, that the light alloy used for crankcase castings is quite satisfactory as a bearing material and so a lined bearing surface is not strictly necessary.

There are, however, certain advantages in using a lined bearing such as cast iron, bronze, bearing alloy, etc., principally lower friction. After machining the bearing bore to size such liners are pressed into place (or in some cases shrunk in) and then finished to give the required fit. Amongst the latest practice in this country is to use split sleeve bearings of sintered metal (*e.g.*, Vandervell bearings which are actually produced from flat material consisting of sintered bronze welded to steel sheet. The bearing is finished by wrapping around a former and then tumbled to remove sharp edges.)

To make a sleeve it is generally sufficient that the bore of the crankcase casting be bored out to size in a single operation. The outer diameter of the sleeve can be similarly machine finished to a tolerance of about plus or minus ·002 in. to ensure a definite interference fit.

Finishing the actual bearing surface is rather a different matter, considerations being the same whether the material is "plain" or the inner surface of a tightly fitting sleeve. A drilled hole is quite unsatisfactory and reaming out to final size is the least of the additional operations required to ensure tolerances and surface finishes of the order required for fit, and also the degree of trueness throughout its length. To reduce the



tolerance still further, and to improve the surface finish, honing may be resorted to as a further operation. There is no definite agreement on this point. Some manufacturers adopt honing as standard practice for finishing the bearing bore on plain bearing engines (*e.g.*, Davies-Charlton, E.D., Allen-Mercury, Elfin): Frog engine bearings are currently reamed to size; some American engines are broached.* (Reaming, theoretically at least, results in a hole which is always out of round to some degree, with as many circumferential high spots as the reamer has flutes, the sharper the reamer the less noticeable this effect. A spiral fluted reamer produces spiral high spots which are less significant, but in any case such high spots are extremely small and do not normally cause trouble. Honing after reaming will not necessarily remove all the high spots, but ideally should produce a "cross hatched" pattern. Much depends on the skill of the operator in getting a first class finish. Probably broaching is the nearest approach to finishing the ideal round hole, although the necessary equipment is very expensive, and it is doubtful if any British manufacturer would consider installing it for the job.

Probably more important from the point of view of actual friction generated by the bearing is the longitudinal shape of the hole. If the hole is barrel shaped—shown exaggerated in *Fig.* 1—then this is almost certain to cause trouble since the shaft is supported by line contact at each end. In a two-stroke the web end of the crankshaft is always loaded in the downwards direction and so the shaft will tend to run on the two point contacts as shown, considerably overloading the bearing at these points. The bearing, as new, may appear to be very nicely fitted with very little play, but in this case will soon score and wear and run hot, denoting excess friction, at the effective contact points.

A bell-mouth bore, on the other hand—shown exaggerated in *Fig.* 2—will allow the shaft to be wobbled up and down in the hand and *appear* very poorly fitted. In practice it may well give excellent performance, even with excessive clearance, simply because there is far more bearing area at the effectively loaded points when the engine is running. As a generalisation, in fact, it can be said that a plain bearing engine (two-stroke) is only as good as its bearing, and the quality of the bearing cannot be judged on apparent *fit* alone.

** BROACHING.—A broach is a metal-cutting tool having a series of teeth formed round it, in individual rows. The teeth increase in size slightly from one end of the tool to the other and are also staggered from one row to the other. Thus when the broach is pushed or pulled through a hole the teeth successively cut the hole to the required form, removing metal evenly over the whole of the bore.*

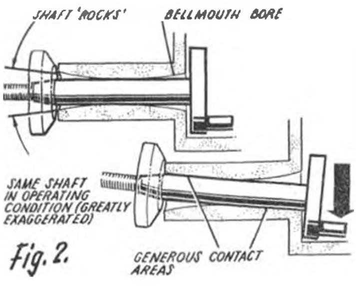


Fig. 2.

Shaft fit selection

Usual practice in fabricating the crankshaft to fit the bearing is to machine to normal allowances oversize to harden and grind to a finished size some ·0005 to ·001 in. above the nominal size. Crankcase bearings are then individually honed to fit a particular shaft, the degree of interchangeability, if any, then depending on the grinding limits and the degree of fit obtained by the honing operator. Thus it is largely improbable that a replacement shaft could be bought to fit an engine manufactured with a honed bearing, since it is generally held that the best fit is of the order of ·0002 to ·0003 in. Hence it would be necessary to have the crankcase as well to select a shaft giving the desired fit.

The same is true of typical American engines where production practice differs slightly in that finished crankshafts are usually graded in batches to within ·0001 in. size and shafts selected from appropriate batches with similar limits for the required fit. Thus the working tolerances on the two mating components produce transition fits and so must be selected individually to match up as clearance fits of the required order. This is not necessarily a disadvantage for where replacements are called for in such cases, if the bearing is available for matching a "good as new" fit is obtained regardless of uniform wear, provided the bearing surface is undamaged.

The fit achieved with selective matching may be as close as ·00015 in. clearance. A more representative average figure on a production line is about ·0002 to ·0003 in. Recently there has been a considerable change of opinion regarding the virtue of relatively tight fits and it is becoming more common to find fits so loose that the shaft has appreciable free play in the bearing on a brand new engine. This is not necessarily an indication that good fits have been sacrificed in the interests of lower production costs or that engine performance will be any the worse. Such generous fits can be deliberate in the first place, and can result in increase in engine performance because of reduced friction. Certainly it will reduce the running-in time required to bed down a new engine with a tight bearing and a generous clearance will tend to promote the favourable "bellmouth" bearing shape described above rather than a line contact bearing.

The main objection to a bearing with a generous clearance fit is that it tends to destroy the seal on the crankcase. The crankcase is effectively the casing of a pump with a predominant positive pressure inside it

ANSWER to the identity of the engine overleaf is that it is an Allen-Mercury 35 with a set of extra-large cylinder fins as used by the "Ecurie Nerk" combat team from Croydon.

when the engine is running. Hence a generous amount of oil is likely to be pumped out through the front end of a loosely fitted main bearing. Only if the leak is excessive is the efficiency of the pump action of the engine likely to be seriously affected. In such cases also the necessary lubricating film of oil between the shaft and the bearing surface may not be maintained resulting in excessive friction and wear.

Bearing tolerance

Thus there is a limit to the amount of clearance which can safely be allowed on a main bearing, again depending on the bearing material. With a clearance much in excess of about ·003 in. loss of power may result. On the other hand, a fairly free bearing is to be preferred to a tight one. The latter is likely to pick up on localised high spots, and at the effective loaded areas, which effect can be exaggerated if the shaft is not finished true. Centreless grinding, for instance, will normally finish to a constant diameter but the actual *shape* may not be truly circular.—*Fig.* 3. Slight chatter or vibration will result in a series of very shallow hills and valleys, always

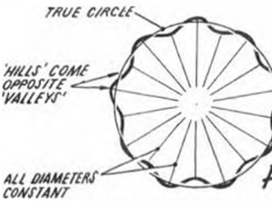


Fig. 3.

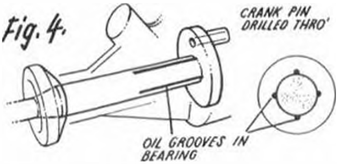
an odd number so that diametrically a "valley" always comes opposite a "hill" (hence the constant diameter). So if the operator is in a hurry, or the machine is in need of attention, the actual shaft section may be anything but truly circular. Faults can also occur grinding between centres, depending on how the shaft is held for grinding, so that it is possible to produce (accidentally) barrel-shaped or waisted shafts, and in some cases even out-of-round shafts, althoughthe latter are relatively uncommon. A barrel-shaped shaft is not necessarily objectionable if this is only slight, but a waisted shaft will again produce line contact and highly-loaded localised bearing areas.

It could also be mentioned at this point that since the shaft loading is the direct result of pressure on the piston, the greatest pressure is produced on the down stroke and proportional to the mean effective pressure in the cylinder. Since this pressure and torque follow an identical pattern, as the r.p.m. of the engine *increases* the actual bearing loading *decreases*. Hence, taking an extreme case, it is possible to have a bearing which would seize if run at a moderate speed, but not be loaded to such a dangerous level at a higher running speed. In other words, such an engine might damage a bearing if run in at a low moderate speed, but not if run straight away at a much higher speed

Lubrication methods

Detail modifications are sometimes incorporated to improve the lubrication of plain bearings, such as grooves cut along the length of the bearing—*Fig.* 4—to distribute the oil; or a spiral formed along the length of the shaft (or bearing surface) to "pump" oil along the length of the bearing—*Fig.* 5—or circumferential grooves in the

Fig. 4.



shaft to retain oil at certain points along the bearing length. The method of *Fig.* 5 can be used to pump oil back into the crankcase on a "leaky" bearing, if the pitch of the thread is reversed. None of these devices, however, is commonly employed today in engine design.

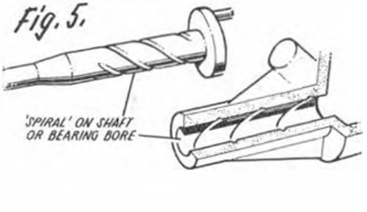
A fair test of a plain bearing is that the bearing should feel relatively cool as compared with the cylinder, touching this with the fingers, as the engine is running or immediately after it has been stopped after a run. If the bearing feels excessively hot, it has a high spot or is too tight, which, to the average engine owner, means simply that he must give it more running-in time, preferably at fairly high r.p.m. If necessary, the bearing may be doused with fuel when running to cool it down and prevent local seizure. An engine with a tight main bearing or a tight spot on the bearing will never develop maximum power. A normal well-lubricated main bearing will warm up until the heat generated by friction is equal to that dissipated by radiation when it will remain at a constant temperature unless the speed or load changes, and this temperature should be quite moderate. The temperature will *increase* on stopping the engine due to conduction of heat to the bearing area from hotter parts of the engine.

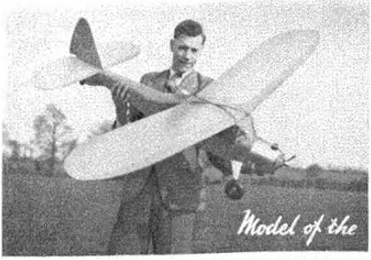
Frictional values

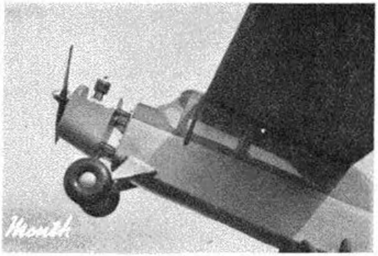
Friction (and heat) will increase with increasing r.p.m. and, in general figures, frictional values tend to become excessive at speeds of 14,000 to 15,000 r.p.m. although at such high speeds it is usual that the piston-cylinder friction becomes the governing factor. Thus a plain bearing engine generally reaches its peak somewhat below this r.p.m. figure. This is not necessarily true of all plain bearing engines and is tied up with the fit and shape of the bearing. Thus the onset of excessive friction may be delayed by using a more generous fit or more accurate bearing surfaces. Few British plain bearing engines, however, peak above 14,000 r.p.m. and most peak at an appreciably lower figure—the larger the engine size the lower the peak r.p.m. as a generalisation. With glow motors, a higher operating r.p.m. is desirable since the torque figure is lower, but here the reduction in internal friction is generally achieved on the piston-cylinder fit at the expense of some loss of pumping efficiency.

(To be concluded next month)

Fig. 5.







MODEL NEWS

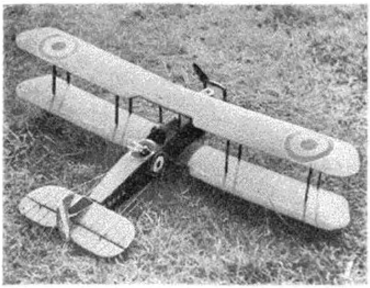
photo views of this month's notable models

SPRING IS IN THE AIR throughout the whole year as far as P. Green of Gloucester is concerned, and the reason is not hard to see when one makes a study of the above views showing the "Model of the Month". Design is an A.P.S. Eros, the time-honoured favourite of the 3·5 to 5 c.c. sports fliers, and although Eros is a very stable performer, as Mr. Green states, "Emergencies will crop up". He rebuilt the fuselage using four coil springs to mount the engine unit, and soon afterwards this neat piece of crash protection was taxed to the full when Eros went slap bang into a tree trunk. The tree came off worst!

Note in the left hand picture how the gap is camouflaged most effectively by an aluminium cowling. Engine is an E.D. 3·46 Hunter diesel, and the springs look remarkably like discarded valve springs from a car or motor-cycle, so if you want to apply the same worthwhile modification to your own model try the local garage for some cast-off springs.

This issue seems to be a Japanese special, with the World Championship won by an OS MAX, and now, in picture 1 a Fuji 15 glowplug engine powering George Gray's nice de Havilland 9A. Span is 36 in. and all up weight 18 ounces, so there is no doubt about this old timer managing a loop or two. Insignia was obtained by studying Imperial War Museum photos and cockpit details were gleaned from a recent edition of *Flight* magazine. Note that the wing rigging has been removed for flying, and the engine is temporarily uncowled for cooling—shame!

The Cambridge lads revived their team race rally again this year, as indicated in Club News, and were more fortunate with the weather. Closing stages were rained out in '54, but this time the event finished in fair weather, with some refreshing results. We refer to picture 2, and Jim Watson of the Lewisham Orbits club who won Class B with J. Nunn. Now this was no hard fought victory, for Jim was the only man to finish 10 miles, the other



three knocking themselves out in the course of events: but how gratifying it is to find that the also-rans do stand a chance of winning occasionally against the string of expertly super-tuned "specials" that so often head the prize lists. Good for Jim!!

The neat Harvard in photo **3** comes from Fife in Scotland, where Matthew Venters of the Kirkcaldy club made the 30-inch controliner from an American kit. He added interior detail in the cockpits—a team race pilot just fits the correct scale—and fitted an Amco 3·5 c.c. BB diesel. All-up weight is 26 ounces, colouring all white with a yellow cowl and wing bands. Interesting point is that the wing area is enough to qualify it as a Class B team racer—though the cowl is hardly big enough to enclose a 5 c.c. engine that would be needed for this variation. When one makes a study of potential scale subjects for team racing, the list of possible types is pitifully small.

Back to the Cambridge team race rally in picture **4** where we see that TR 2 driving husband and wife team that managed to win Class A by a slim margin. We understand they also topped the London Area Rally with the same model, and no wonder, for this one is a genuine 90-miles-an-hour racer—Oliver powered, of course. The couple are Les and Ann Hayward of Chingford, who handle all the pit stops, while Sid McGoun tries to keep up with the rate of rotation at the handle end.

Stan Perry of Gloucester sent in the smart sport model picture, number **5**, and since the model uses that popular Davies Charlton ·8 c.c. diesel, it is christened the "Merlin Cub". Span is a neat 36 in., weight exactly one pound, and to cope with whatever might happen as a result of the 12 ounces per square foot wing loading, there is a pendulum-controlled rudder. Finished in royal blue and silver, with home-made transfer decoration, the Cub is a regular rally flier.

One of the most popular A.P.S. designs for a fast flying stunt model is the Wildfire, yet we wonder how many would recognise the one in photo **6**? H. V. Mitchell of Borough, London, S.E.1, thought he would apply a few changes on his Amco 3·5 c.c. version, so he decorated it in American Air Force style. By adding a spinal fillet and bubble canopy, the transformation is most attractive and one which could well be applied to many other established stunt designs that tend to get so "same-ish".

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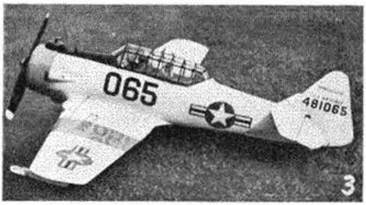

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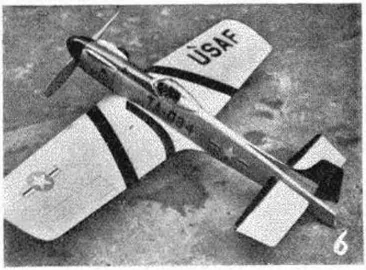

6

Club News

THERE WAS A SEQUEL to an announcement I included in last month's news concerning a certain club who sent in a date and fixture for a model rally. No sooner had the September issue reached the newstands and model shops than I was besieged by individual senior members of said club, who were asking what was going on. Truth emanated that some misguided junior had sent me the slip of paper with details (unstamped, too!) and gave the impression that the rally was open to visitors. This was quite wrong. For not only is the site mentioned, one with a shadow of local noise abatement hanging over it, but also the club concerned are in no position to act as hosts for any open rally.

Moral of this experience is that when submitting rally or gala detail for inclusion in my "For your diary" column, please be sure you have the backing of the club, and that the events are open to all.

Southern

Eighteen modellers have formed the **LANCING M.A.C.** with regular meetings in the local youth club on Thursdays while negotiations are going on for space allocation in local parks for c/l flying. The club is making an R-6R as a radio control project, and is going to make up a receiver transmitter outfit too. Also with a radio controlled flavour is the news that an informal meeting is to be organised on September 30 by the **FLYING DRUIDS** at Stoney Cross airfield, alongside the A.30 road from Ringwood to Romsey. There will be single channel and multi control sections. Contact Dept. R, 68 Salisbury Road, Amesbury, Wilts, for full data.

For your Diary

September 16th
All Britain Rally—Radlett—all classes.

September 23rd
Model Engineer Cup (Team Glider).
Gutteridge Trophy (Wakefield).
Area semi-centralised.

September 30th
Midland Area Control-line Rally Wellesbourne Mountford—T/R, Combat.

September 30th
Roberts Cup—Rubber Driven Flying Boats—Pond on Blackheath, London, S.E.3 (revised date).

September 30th
Informal Radio Rally—Stoney Cross Airfield, Hampshire—Rudder and Multi-Control.

October 7th
Sidcup C/L Rally—Hall's Sports Ground, Dartford By-Pass, Kent—T/R, Combat.

October 7th
Epsom Slope Soaring Rally—Box Hill, Surrey (revised date).

October 21st
Hyde Rally—Hyde, Cheshire—all classes.

South Eastern

Regular indoor meetings are the subject of the latest **SOUTHERN CROSS A.C.** newsheet, and, of course, they are quite right when they say that a get-together every week is the thing to hold the club spirit. They had a "Needle Noddle Nut" night the other week when members had to bring a collection of strange materials and assemble them into a chuck glider of any sort providing it was unconventional. Following week they had to fly the results of their labours. Sounds like a good idea.

EASTBOURNE Club had great fun at a display at Pennetts Town with up to five at a time in the combat circuit. 1.5 c.c. is the adopted size for ½A team racing, and I think the boys are on the right track there. Tony Fletcher has a butterfly tailed Allbon Javelin model, and clubmate Terry Parris has another design with an Allbon Sabre. Should make an interesting comparison to see the pair in a race.

South Western

An invitation is extended to all radio-control enthusiasts (veterans or beginners) to join the newly-formed **"SOUTH-WEST RADIO-CONTROLLED MODEL FLYING SOCIETY".** Founder and hon. secretary is Mr. Harry Stillings, 6 Alpha Street, Heavitree, Exeter ('Phone: 59864), who will be glad to give details to anyone interested in joining. Subscription rates have not yet been fixed, but will be only nominal, as the Society exists to further the interests of radio flying, and not to make money. Mr. Hilton O'Hefferman, of Thurlestone, South Devon, has been invited to act as chairman—Mr. O'Hefferman held the world's R/C duration record a couple of years ago.

Regular radio-control rallies and meetings will be arranged, starting this autumn, and will be held at selected venues in different parts of the region. Hitherto there has been no provision for radio men in this area, and the Society has been formed to rectify this state of affairs. It is, therefore, hoped that all R/C flyers in the region will contact Mr. Sillings as soon as possible for details, and so help to get activities started without delay. Membership is open to all, whether already members of a local Model Club or not.

East Anglian

The **1451 SQUADRON AIR TRAINING CORPS M.A.C.** have made their first public appearance since forming up last November. This was at the local Haverhill (Suffolk) gala where they had twenty models on static show and airborne. Among them was a control line Short Stirling by Flt. Lieut. Goodchild with two E.D. 2·46s and a pair of E.D. 3·46s. Best-made model was a KK Racer which won a new E.D. Baby diesel. Lucky lads have the use of a local deserted airfield for free-flight.

NORWICH M.A.C. have been preparing for an onslaught on the All-Britain Rally at Radlett, but found time for a display at Pulham Market on August 4, with combat sessions, and Mr. Davies' scale Grumman Guardian and OS 35 glowplug engine adding to the noise and fun of the fair.

Area rally went off well at R.A.F. Debden on July 22, and the scramble contest was very popular, though only half the entry survived the first half-hour! Mick King and George French each lost a model in the surrounds, so hired an Auster from Rochford on the next day and cruised around at 1,000 feet. Models were quickly located from this height, and the expense was considered well worth while. Results are given on next page.

London

Sad weather caused postponement of two events in recent weeks and I am most happy to see that the organisations have not given up and are running on revised dates (see the Diary). First was the slope meeting at Box Hill, run by the **EPSOM** lads. This was a real blow-out, and I doubt if even the birds were able to do more than walk that day. They even closed Southend pier for fear it might break in half!! Even so, a few hopefuls arrived from Burton-on-Trent and many came along just to see what was happening. Perhaps the conditions will be better on the new date, October 7. Other delayed event is the Roberts Flying Boat Cup now to be on September 30 and run by **NORTH KENT NOMADS M.C.**

An increase in rent by the Council for the clubroom hire is threatening the financial standing of the **CRYSTAL PALACE M.A.C.** So the lads have wisely gone under the wing of the Croydon Youth Organisation and will meet at Cypress Road School, Norwood Hill on Mondays. This will reduce the overheads, and give greater scope for activities.

SIDCUP A.S. are including a stunt contest in their rally at Hall's Sports Ground—good show!—further details from J. Templeman, 718 Sidcup Road, New Eltham, S.E.9. In the *S.A.Ssenach*, the Sidcup A.S. new sheet, there's a suggestion for ½B racing. This to be for the 3.5 c.c. owners, and half way between A and B racers. Even if it did have some support I could soon see this being known as the K & B 19 class, and the original purpose of looking after the 3½ diesels would soon be lost.

HAYES beat the **NORTHERN HEIGHTS** in the Inter-Club Challenge: but only by the smallest possible margin—exactly one whole second!

In the **CROYDON** Gala, Hayes member J. Baguley shook the free-flighter community with a slope soaring flight of 4 : 07 to win a fly-off in the hand-launched event. Model is a 96-inch lightweight glider which also placed second in open glider from two launch.

South Midland

When quite a large area of the country was blanketed by a black and sombre cloud with frequent hail and rainstorms, the Cranfield Rally organised by the area enjoyed bright sunny, if windy, conditions and only suffered from half an hour of rain. Power event was almost like the World Championships all over again, this time with Dave Posner beating Ron Draper to the first place. Very popular was the 6-engine raffle run for prize money and area funds. Modellers enjoyed this meeting on the fine airfield, and free of inquisitive spectators; no wonder it grows in popularity each year.

Midland

BELPER AND D.M.A.C. had a big night recently when the local newspaper sent along a reporter to see the club at a typical meeting. It is said that never before have so many models been seen under one roof! The reporter could hardly get in for the number of models brought along for him to see, and the ensuing report spoke of the club in glowing terms which should be valuable publicity for future membership. A new club has been formed at **BEDWORTH** near to Nuneaton, with 21 members and newly affiliated to the S.M.A.E. They have a regular clubroom over the chairman's Craft shop, use a local farm on Sunday mornings and would welcome experienced modellers to give them a guiding hand in organisation, etc.

After the fine control-line response at the Midland Area Rally, Wellesbourne-Mountford, Len Harding and his crew had a second thought about a control-line rally, and the date is now set at September 30. Over the 'phone, Len mentioned many events and in the rush to get this to press in time for you to see it, I regret that full and exact detail cannot be quoted. Team Race for certain, Combat also and maybe Stunt, with good cash prizes, etc. Contact L. Harding for pre-entry at 28 Hangleton Drive, Starkbrook, Birmingham 11.

A gala day for the **LEICESTER M.A.C.** on August 21, and advanced planning for the winter programme, are items on this club's newsheet. With booked indoor nights at Catherine Street School, opening on November 9 with a lecture on Microfilm Models by Jack Marsh, the club seems to have its organisation well buttoned-up—quite a distinction I can assure you at Leicester!

East Midland

The **FORESTERS** team racers have had mixed fortunes. So narrowly beaten at Cambridge, nowhere at S. Midland, first at Woodford, etc. Perhaps those almost two-years old models are beginning to give up the battle to stay in one piece. Neither have the free-flight boys had much luck; Ken Oliver lost his A/2 after two max's at the trials and had to complete with a reserve. Doug Bolton brought home honours, however, by winning chuck glider at the Area rally and J. Howard and G. Hawden disposed of the other entry in combat at the same meeting.

North Eastern

The **WEST HARTLEPOOL D.M.A.C.** report that they successfully survived a battle with the elements on August 18 when they gave a display in wind and rain at the local parks' annual show. In the local inter-club contest with **THORNABY** the result was an amicable draw.

North Western

During the annual visit to Woodford, and the *Stockport Express* Rally, **WIGAN M.A.C.** report the loss of Bob Baldwyn's Wakefield, Tom Reid's Torp 15 power job, B. Talbot's Webra model and J. Aspinall's Frog Vibramatic. They all dee-teed down just outside the 'drome and though clearly addressed no trace has been heard of them since. A pity that Bob Baldwyn lost that Wake, he needed it for the fly-off and had no reserve.

BRAMHALL M.A.C. now has a regular flying field and September will see the club comps in full swing. Mostly these are "one-model" affairs including the *Golden Wings* for glider. Another newish club is that at **ST. HELENS,** where some of the old regulars of the once active community have gathered together and meet each week-end at their field off Southport Street, Newton Road. They call themselves the "Red Devils".

A record number of spectators attended the **CHESTER** Roodeye for the Autumn Sports. Rood—a Cross, and Eye—an Island, the Island of the Cross which is what Roodeye means, is Common land which belongs "by right" to the Mayor, Aldermen, Councillors and Citizens of Chester for the use of the people. It was on this land, during the days of the Danes, that the first game of football began—only then it was "Headball" because the Citizens of Chester would kick the head of—a recently executed—Dane about. From the head we progressed, in kindlier times, to a ball, and in the 16th century, because the football was so rough and spectators were being injured, Races were substituted. These Races still take place in May on the Roodeye.

As in past years the Chester M.F.C. held their Annual Control Line Meeting on the Roodeye as a feature of the Autumn Sports. Entrants came from as far apart as Tynemouth and Nottingham as well as from all over the North-Western area.

I have an impressive list of events and entry fees for the **HYDE** Rally on October 21, and advise all interested to get full data from the secretary at 21 Harding Street, Newton Hyde, Cheshire. Refreshments will be arranged, and there's a pub just opposite the field, so that inner man will not leave unsatisfied.

Scotland

The **SCOTTISH AEROMODELLERS ASSN.** control-line Nats were held at Kirkaldy, combined with the local club gala. Weather was perfect, but the **PRESTWICK** lads could not repeat their British Nats performance with the *Tiger Terror*; like many others they had trouble with the rough surface. Class A and Class B were both won by R. Irvine of **PERTH,** and J. Muir from Prestwick was combat winner. In open stunt, it was I. Dunn of Perth that gained top points, making it a fine round-up for the lads from the dye-town. I understand that he uses a Fox 35, and in second place Ron Irvine had a McCoy 60 powered *Taurus*. They like 'em big and noisy over the border. There's a new name in engine tuning, too, for Irvine's motor in Class B was a Barclay-McCoy, a popular engine among the Scots.

Wales

The Welsh Rally at Fairwood on July 22 was blessed with perfect weather, but only members from five clubs rolled up. Most entries were for Class A team racing, won by **EBBW VALE** from **CARDIFF.** Engine was an E.D. 2.46 in a *Sorcerer's Apprentice*. In power, Cardiff gained first and second places, Horlock winning with an Oliver Tiger powered *San de Hogan* followed by a Webra Mach I in a standard *Mallard*. Stunt went to **PORT TALBOT,** as did Glider, while Frank Holland from **SWANSEA** topped the bill in Rubber. Incidentally, I learn that the Cardiff lads are somewhat divided in minor viewpoints which I hope they will soon iron out—after all it's only a hobby—why can't they all pull on the same oar?

Ireland

Winners of the **LARNE M.F.C.** open contests were L. Blair in rubber and power with a *Hereward* and *Creep*, and in glider, J. Strain won with a *KK Chief*. Latest club models include an *R-6B* and *Waveguide* so there is going to be some radio control activity.

Membership of the **M.A.C.I.** stands at about 70 this year, I believe, and in 1953 this figure was 1,000! Weather has not helped, nor has the unavoidable succession of resignations from the committee. Such a fall-off in support for the hobby must indeed be most discouraging for the hard-core of valiant enthusiasts who keep at it, and I trust they'll not let it get them down in the dumps. Modelling is like that, it comes and goes in waves of enthusiasm and '56 doesn't appear to be a particularly bright one—in Ireland at least.

RAFMAA

The model club at **R.A.F. WAHN** in Germany recently issued an invitation through our columns to all B.A.F.O. modellers to contact them. Not one has responded to date, and the 2nd T.A.F. Championships have been postponed from August 26 to October 2. I hope they get more support than seems apparent at the moment. The lads overseas need a spot of encouragement and it seems to me that those in 2nd T.A.F. are ready to take any opportunity that arises to further their enjoyment of the hobby.

Pen Pals Wanted

For A. L. Brookes, 132 Over Lane, Openwoodgate, Belper, Derbyshire, a pen-pal who can correspond in French, interested in free-flight.

For Bogdan Janiak, Spitalna 3 m.2, Wloclawek, Poland, a pen-pal in Britain to exchange magazines, etc.

All for this month.

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West Hartlepool, Co. Durham.

Rally Results

I.R.C.M.S.
RADIO CONTROL INTERNATIONAL
WELLESBOURNE MOUNTFORD
AUGUST 5, 1956

		Points	
1.	R. Webster	361·3	reed
2.	R. S. Higham	346	"
3.	O. M. Hemsley	317·6	"
4.	H. Boys	266·2	single
5.	K. Fisher	215·1	"
6.	F. Johnson	158	"
7.	R. Palmer	150·7	"
8.	S. Parkinson	141·1	"
9.	A. Rhodes	124·3	"
10.	A. Jones	38·5	"
11.	A. Breeze	21·3	reed
12.	W. Askew	5·5	single
12	V. Blackwell	5·5	"

11 others returned no score

CAMBRIDGE TEAM RACE RALLY

Class "A"
1. L. Hayward — Chingford

Class "B"
1. J. Nunn — Lomac

Combat
1. R. Standing — Ecurie Nerk

EAST ANGLIAN AREA GALA

Glider		
1. G. French	Laindon	8 : 23
Power		
1. D. Miller	Cambridge	8 : 58
Rubber		
1. M. Presswell	Thameside	5 : 00
Scramble		
1. N. Willis	Anglia	16 : 41
Stunt		
1. N. Willis	Anglia	295 pts.

CHESTER CONTROLINE RALLY

Class "A" Team Race
1. E. Houghton — Wharfdale

Class "B" Team Race
1. T. Rowley — Heath M.A.C.

Stunt
1. J. G. Eifflaender — Macclesfield

SOUTH MIDLAND AREA RALLY—CRANFIELD

1. R. Monks	Birmingham	9 : 00
Power		
1. D. Posner	N.W. Middx.	9 : 00
Glider		
1. L. Barr	Pharos	9 : 00
Team Race "A"		
1. P. Hartwell	Enfield	10 : 19
Team Race "B"		
1. D. Platt	Wanstead	11 : 00
Combat		
1. D. Wilks	W. Bromwich	
Radio Control		
1. J. P. Webster	C. Member	48 pts.

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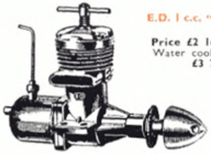

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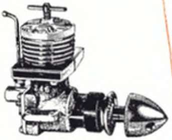

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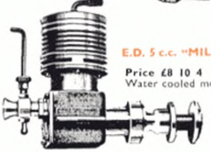

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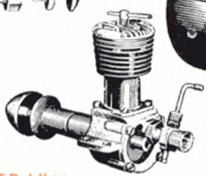

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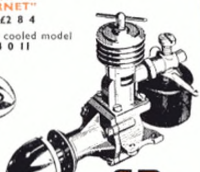

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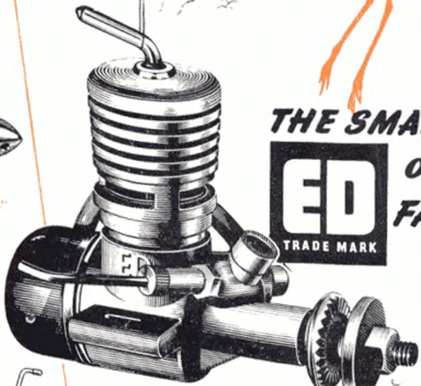

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