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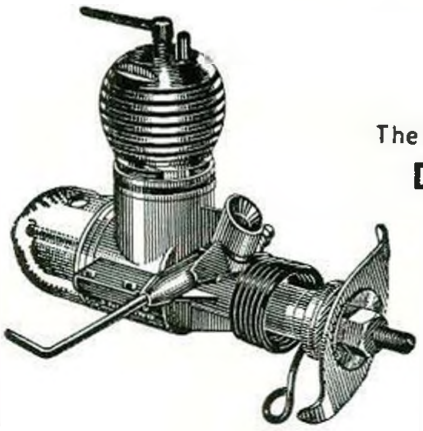

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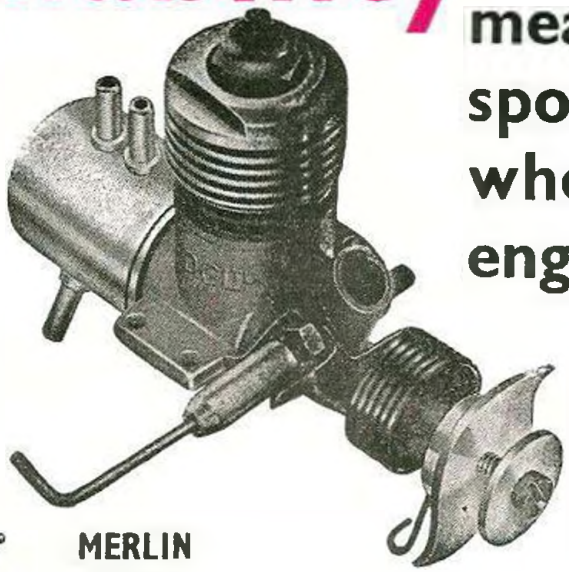

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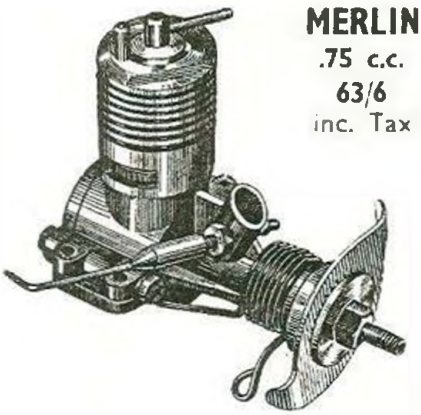

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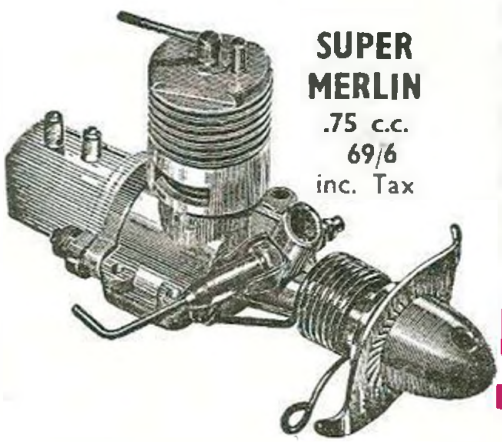

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March 1968 VOLUME XXXIII No. 386

CONTENTS

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Editorial Director **D. J. LAIDLAW-DICKSON**
EDITOR **R. G. MOULTON**
Advertisement Manager **ROLAND SUTTON**

COMMENT

Whatever the tales of woe that emanate from our diminishing aircraft industry, Air Force and Fleet Air Arm there is little doubt that 1968 will become a vintage year of aviation interest. The Royal Review to celebrate the 50th Anniversary of the R.A.F. on June 14th at Abingdon; the SBAC display in September; a series of open days at the Shuttleworth Collection, Biggin Hill Air Fair in May, etc., etc., will more than satisfy the aerophile.
For the modeller, the year will be no less important. The contest programme is more comprehensive than ever before and includes new events, which are bound to create more interest. Not since the 1952 Championships at Gosport have the British modellers enjoyed the hospitality of the Royal Navy for our annual "Nats" and Whit '68 promises to produce a most happy reunion. This should not be misconstrued as a deliberate break from the long association with the Royal Air Force. It is simply a case that the Navy offer, coupled with the creation of a Carrier Deck event, provides the opportunity for our friends in the R.A.F. to take a well earned rest. And the R.A.F. too is promoting a competition for aeromodellers interested in static scale in connection with the Central Flying School at Little Rissington. We look forward to a year of challenge, bright skies and calm air to make us a busy season all the more enjoyable.

on the cover

Tony Clements' one-eighth scale B.E.2c free flight scale model which was one of the entries at the 1968 "Model Engineer" exhibition weighs 3 lbs. and is powered by a Mills 2.4 cc. diesel. This remarkable model has full navigational equipment (scale map). Photo recce installation (wooden camera on fuselage side) and is operational in the ground attack mode (forward firing fuselage gun). Thus the B.E.2c could be called a forerunner of the McDonnell-Douglas Phantom: but what a difference!

next month

Next instalment of Trevor Faulkner's intro to **Magnet Steered Slope Soaring** deals with making the parts, David Boddington introduces the AerMacchi **"Santa Maria"** simple scale model for .049 single channel radio control, with full-size plans and Peter Chinn tests the **Oliver Tiger Mk. IV.** Scale subjects are the Australian **Victa Aircruiser 210** in Aircraft Described and the **SAAB Safir** as a 37 inch C/L design for 2.5 cc. Plus, of course, regular features on **Latest Engines. Basic Aeromodelling, Free Flight comment** and News from the Clubs. Out on March 15th.

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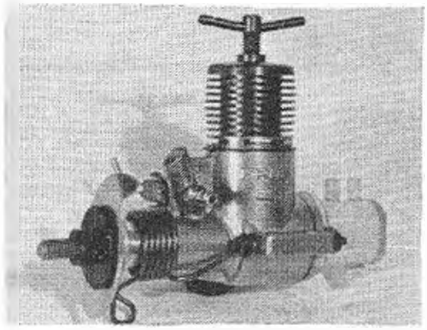
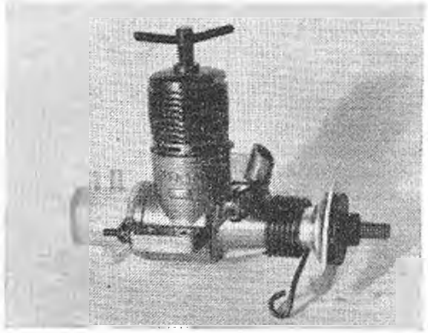


FROG 100 Mark III 65/6

This is a high speed rotary valve engine (16,000 r.p.m. plus) specially developed for easy starting—just the job for sports models or beginners to power flying. Bore .416 in. Stroke .460 in. Capacity 1 cc. Weight 3 ounces (with tank). Spring starter standard. Silencer, available as an extra, 6/6.



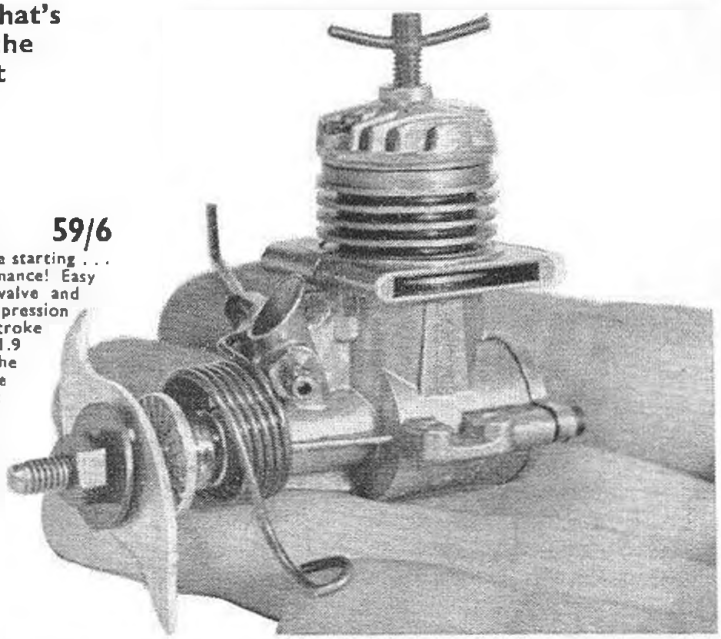
FROG 150 Mark III 72/6

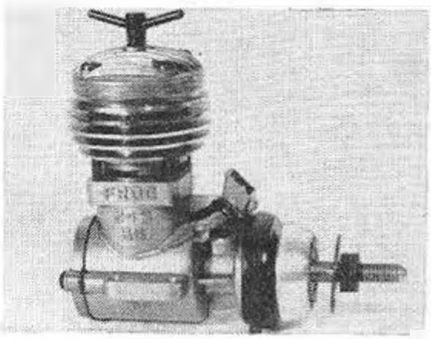
Develops over .15 b.h.p. and the logical choice for a 1.5 cc. contest engine or extra performance from a control line or sports model. Spring starter standard. Tank can be detached. Bore .500 in. Stroke .460 in. Weight 3½ ounces (with tank). Silencer, available as an extra, 6/6.

FROG 150 M 85/-
Marine version fitted with watercooled head, flywheel and coupling.

FROG 80 59/6

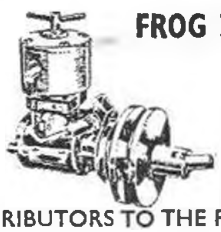
Positive, dependable starting . . . dependable performance! Easy to handle needle valve and vibration-proof compression screw. Bore .400", Stroke .392". Weight 1.9 ounces. Here's the ideal, trouble-free engine for free flight models up to 44" span, or control line up to 30" span. Speeds up to 13,000 r.p.m., plus. Spring starter fitted as standard.



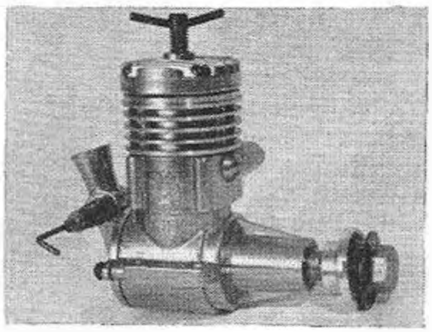


FROG 249 BB 107/6

Step up into the International Contest Class with this 2.5 cc. twin ball race racing engine. Develops well over ¼ b.h.p. whilst retaining easy starting and handling. Robust design gives great strength and ensures the '249' will stay 'on tune' for very long periods. Special features include angled needle valve, special bearing seal, high speed porting, etc. Bore .581 in. Stroke .574 in. Weight 6.1 ounces.



FROG 249 M 127/6
Marine version fitted with water-cooled head, balanced flywheel and special coupling.

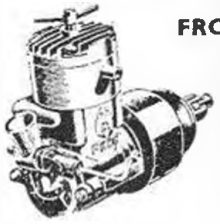


FROG 349 109/6

The ideal power plant for Combat or the larger sizes of free flight and control line models. Original barrel-valve induction, single ball race main bearing, special porting for smooth, economic performance. Bore .666 in. Stroke .610 in. Weight 6¾ ounces.

FROG 349 R/C 127/6

The same basic engine fitted with muffler and barrel-type throttle. Weight 7¼ ounces.



FROG 349M. 149/6
Marine version with watercooled head, flywheel and coupling.

FROG 349 M R/C
Marine version with throttle. **169/6**

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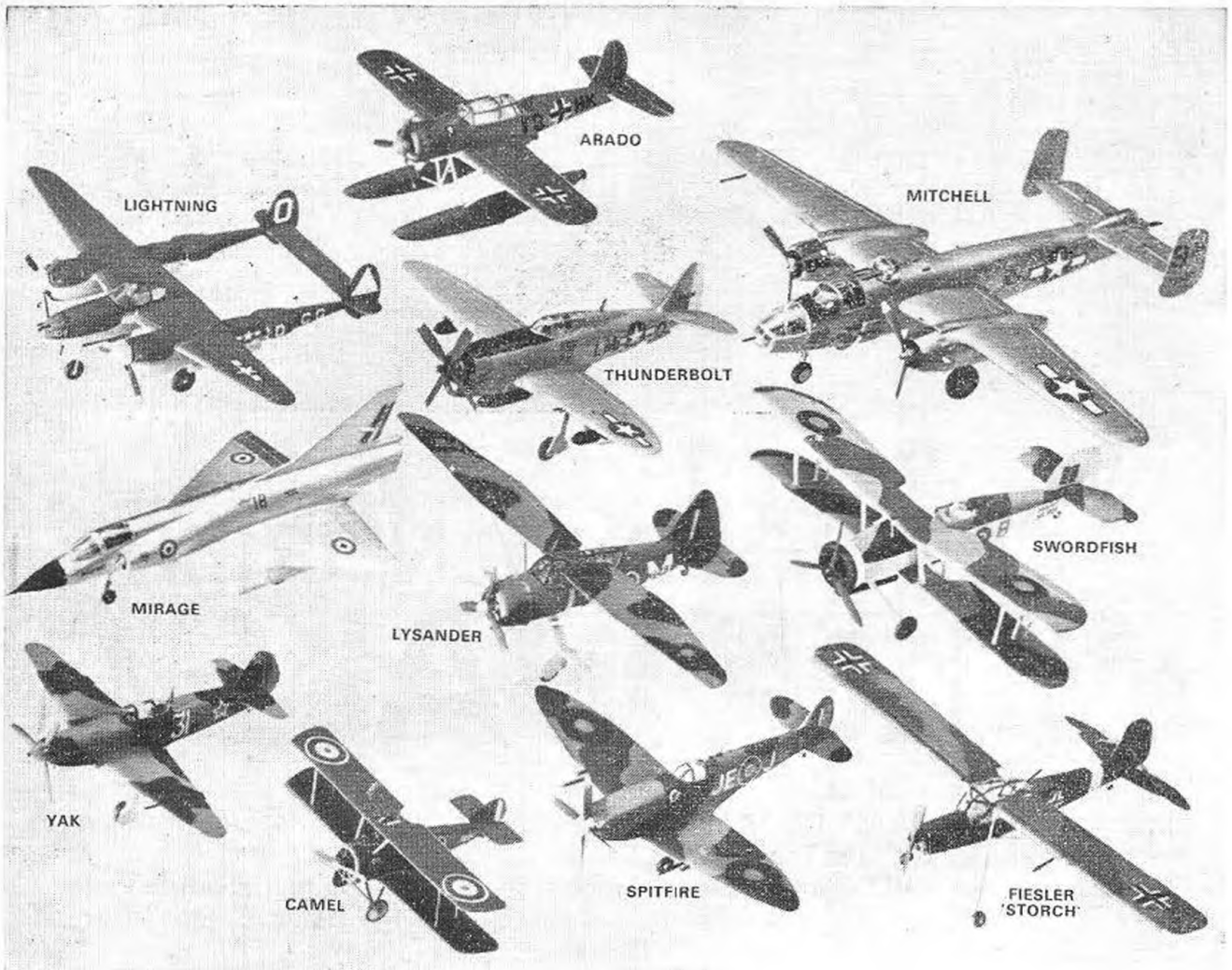

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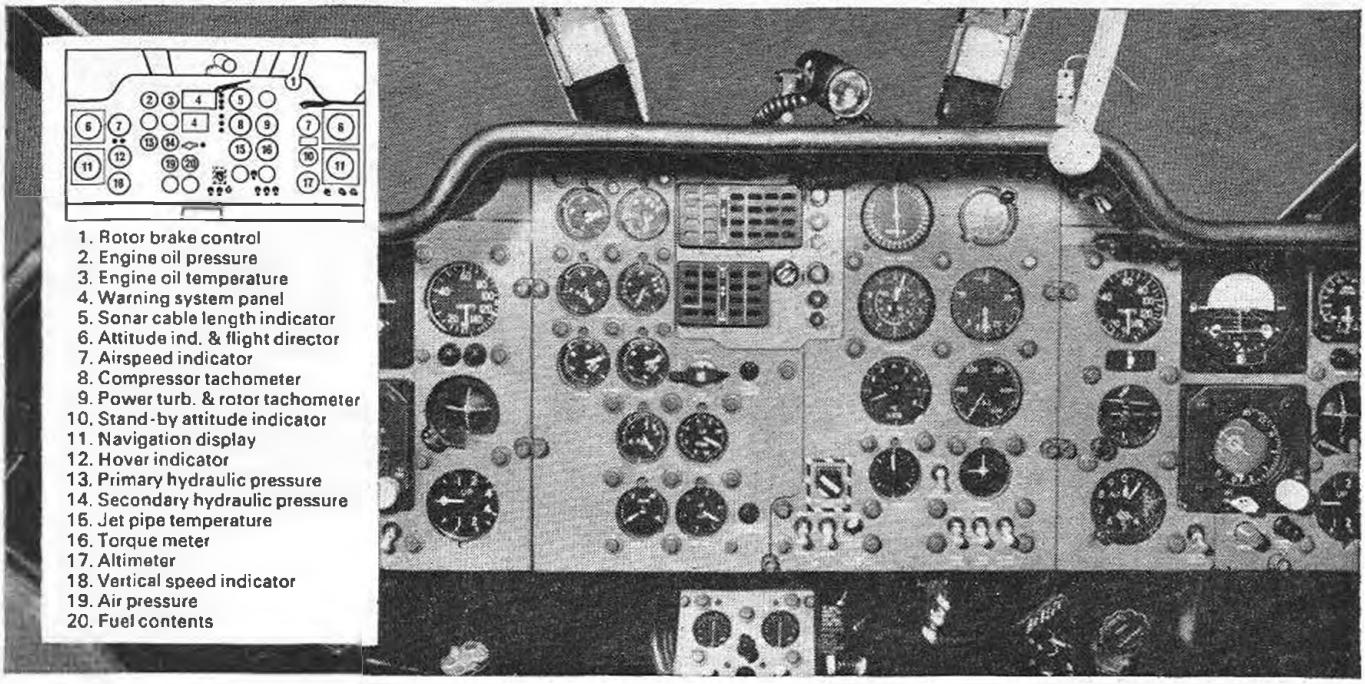

This is the instrument panel in the cockpit of the Wessex.

Take a look at the Wessex

—*double-rôle helicopter of the Royal Air Force*

The Wessex is the first twin-engined, single-rotor helicopter in service with the R.A.F. It has a long range (345 miles at 115 m.p.h.) but is equally useful on short distance 'shuttles' such as carrying troops, supplies or on aero-medical duty. And, if one of the two Gnome shaft-turbine engines is out of action, it can still fly comfortably with one engine. The Wessex is quite a helicopter and it needs quite a team to keep it flying.

There are even more advanced types of helicopter planned for the Royal Air Force.

Today's R.A.F. needs young men now. This could be your future. If you are interested in aeroplanes, flying and an adventurous life you ought to consider a career in the Royal Air Force. There are many different ways of entering the R.A.F.—aircrew, ground officers, apprentices or ground trades. Find out which one is for you. Post the coupon and we will send you a free illustrated leaflet.

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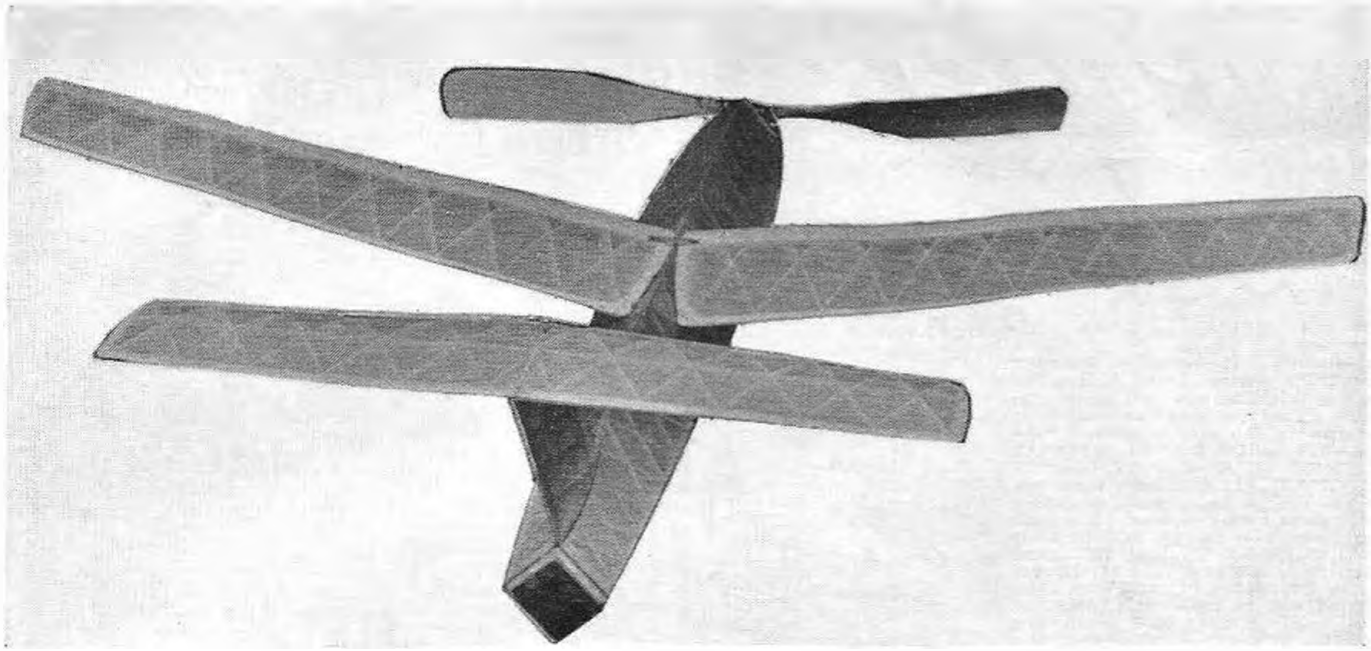
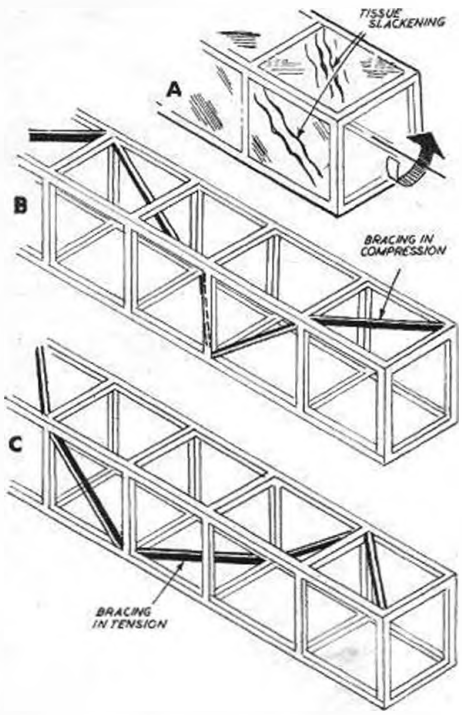


BASIC FACTS on DIAGONAL BRACING

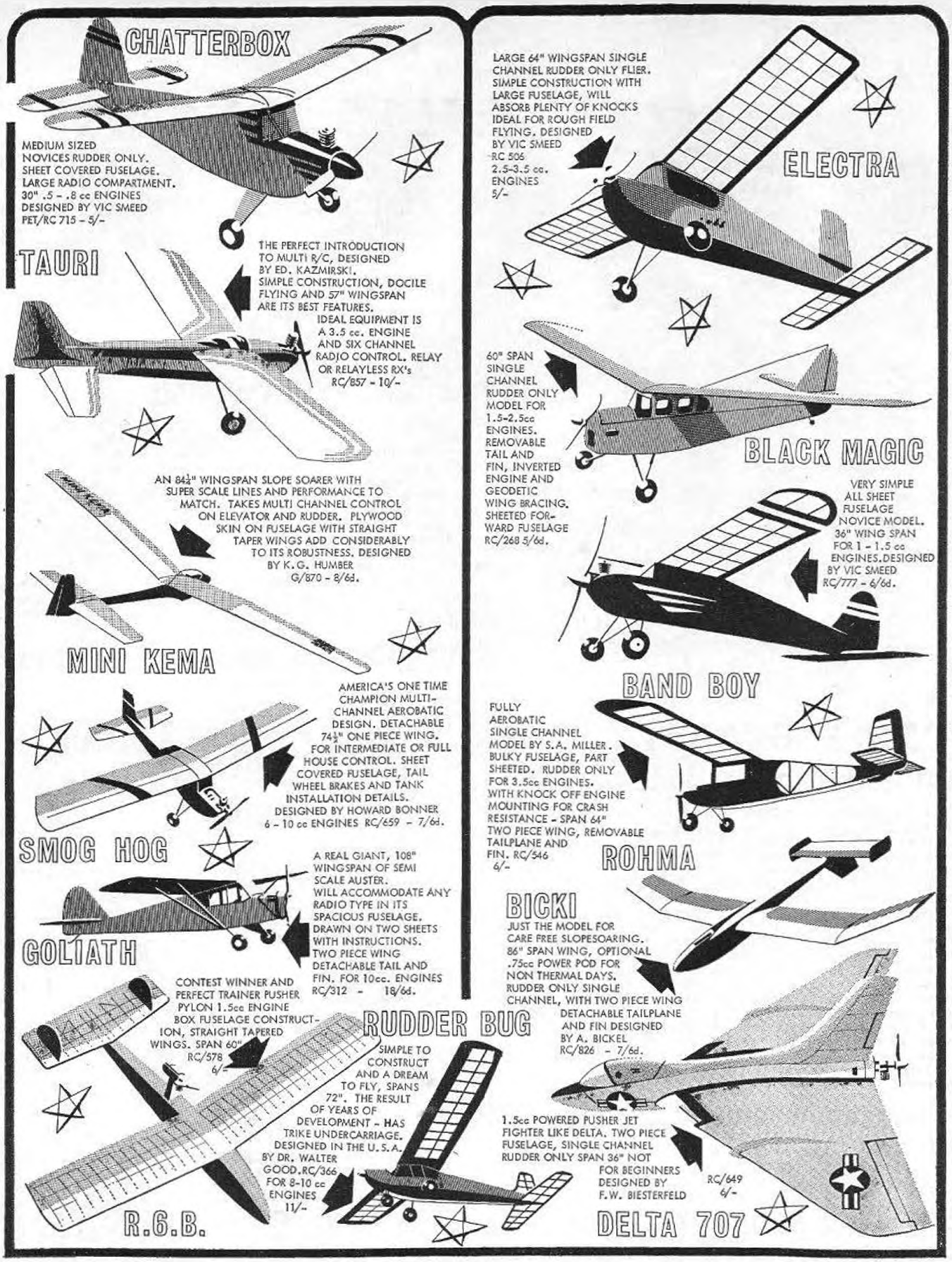


Simple frameworks are not particularly resistant to torsion. That is why the fuselage on a lightweight rubber model with a powerful motor may show a marked tendency to twist when the motor is fully wound. Most of the stiffness to resist the torque of the wound motor, in fact, comes from the doped tissue covering. Try twisting a covered but undoped fuselage and you will see ripples developing in the covering, indicating that each panel in the fuselage is distorting diagonally—see Fig. A.

Now there is a very simple way of stiffening a frame against this distortion with a diagonal brace, inserted so that it will be loaded in *compression*. A series of such diagonal braces carried along the fuselage as shown in B will make the framework rigid even without covering—a good tip for building a really light fuselage. Note, too, that only *one* brace is needed in each *bay* of the fuselage, so the extra weight is negligible. You can, of course, double up the bracing, if preferred for even greater stiffness.

If you really want to get down to absolute minimum weight and still have rigidity, use rectangular section braces (say 1/8 x 1/16) to be loaded in *tension*—Fig. C. Smaller section braces will take the load because there is no danger of them bowing.

Diagonal bracing makes stronger, rigid and *lighter* fuselages possible (or can be used to stiffen any 'box' framework loaded in torsion). In just the same way, Solarbo Balsa makes stronger, lighter and better models for Solarbo brings applied science to bear in the selection, grading and preparation of Balsa for aeromodelling use. There is no better—or more consistent—Balsa than Solarbo.



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RADIO CONTROL MANUAL

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Bright, full colour photo dustcover, cloth covered boards, gold-blocked title on spine. Printed on high quality gloss paper replete with photo illustrations, drawings, sketches, diagrams and the most complete tabular matter ever.

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THIS IS THE SECOND Radio Control Manual, bringing news and information on all the latest developments within the R/C hobby. From the simplest single channel systems, up to the most sophisticated, there is something for everyone. In this new edition, Ron Warring discusses control surface design, while well known engine expert Peter Chinn discusses R/C engine developments, tracing them from the very first, more than ten years ago. He completes the picture with tabular data on over 100 current R/C powerplants. For R/C boat enthusiasts Don Careless provides expert advice on the art of multi model racing, the fastest growing sport within the model boat movement, and still in the water, Don Baxter provides hints and tips on the operation of R/C water planes. Racing has become very much part of the radio control hobby. In the aircraft field, models are patterned after the famous full size "Goodyear" racers of the late 1940's and raced around a triangular course at astounding speed. It is not surprising that in the last two years, this activity has become very popular. Britain's top ace in this field is Peter Waters, who passes on the secrets for successes in R/C Goodyear racing. Added to all this valuable information are 17 scale-drawings of some of the world's leading model designs which, in all, make Radio Control Manual number Two an invaluable reference world for all radio control enthusiasts.

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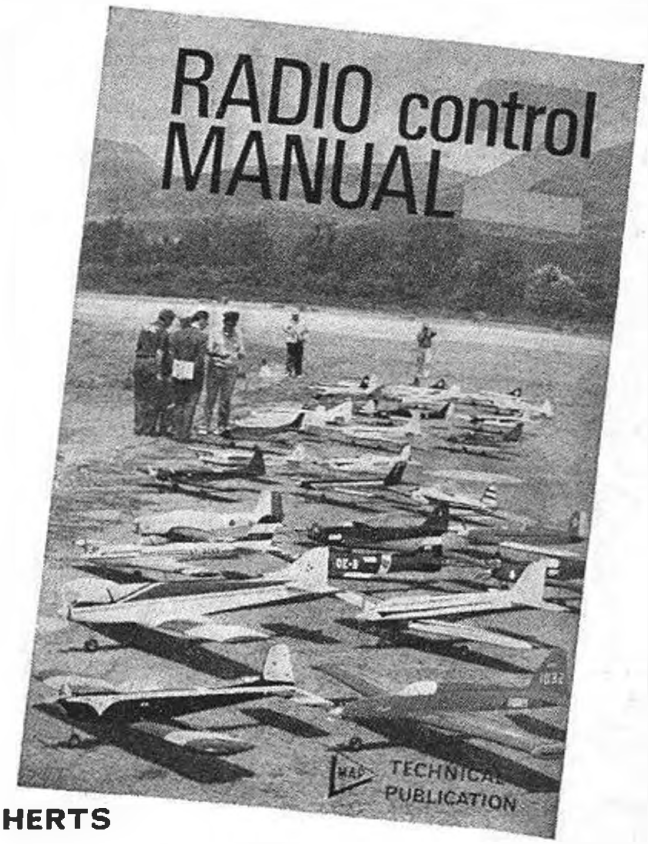

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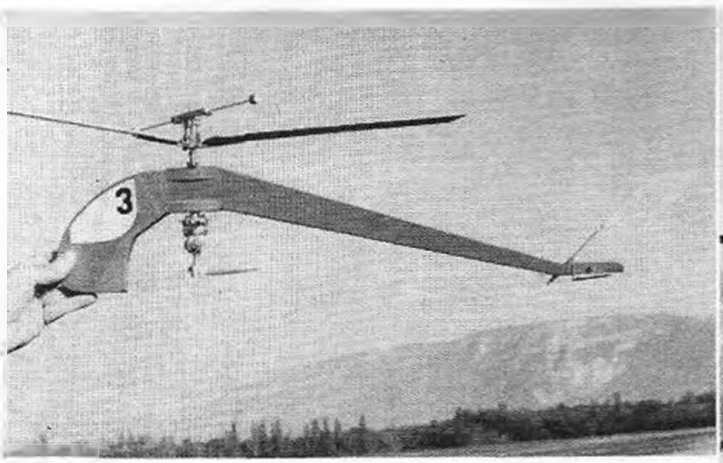
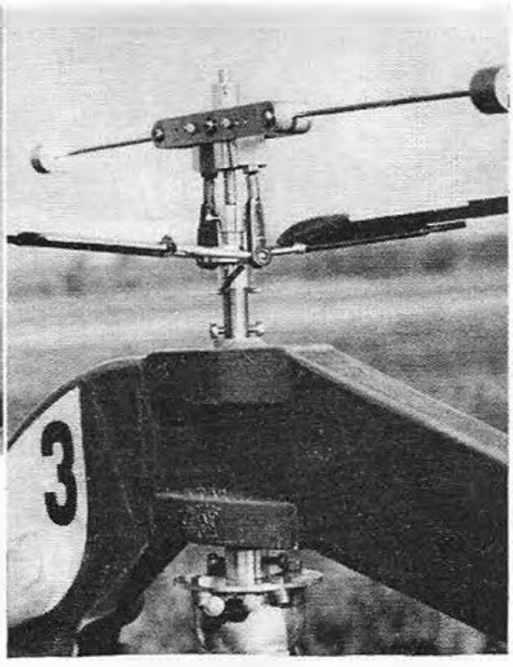




Heard at the Hangar Doors . . . .

The Simprop Helicoptar challenge for big money prizes is attracting many new and ingenious approaches to a very difficult subject. Roger Maret of Geneva is perfecting a free flight model with auto-stability before attempting radio control.

NEW CONTESTS introduced by the Services deserve full support. The Royal Navy is making a 44 ft. x 8 ft. Carrier deck for first appearance at R.N.A.S. Yeovilton, to be the venue for the British National Championships. Brief specifications are are included in Control Line News on page 131 for the two classes of model. Since the event demands nothing but the best in aerodynamic and throttle control, it brings a new challenge which will bridge the gap between aerobatics and team racing. The Navy will also make the Carrier available for Major Rallies—an opportunity which we are sure will not be missed. The Royal Air Force contest is for static scale models of types which have seen service with the Central Flying School at Little Rissington. They range from the Maurice Farman to the Gnat and cover several dozen subjects and five different helicopters. The contest will be divided into four classes. Class I is for 1/24th scale exhibition quality fixed wing aircraft models. Class II for 1/24th scale Helicopters. Class III for 1/72nd groups of aerobatic teams (imagine five Snipes as a formation display!) and Class IV for the under 16's only calling for a range of early aircraft to 1/72nd scale. The entry fee of 5/- will include supply of a drawing and where possible, other references. Initial enquiries can be addressed to F/Lt. A. J. Gunn, Central Flying School, R.A.F. Little Rissington, Cheltenham, Gloucestershire.

S.M.A.E. CONTEST PROGRAMME 1968

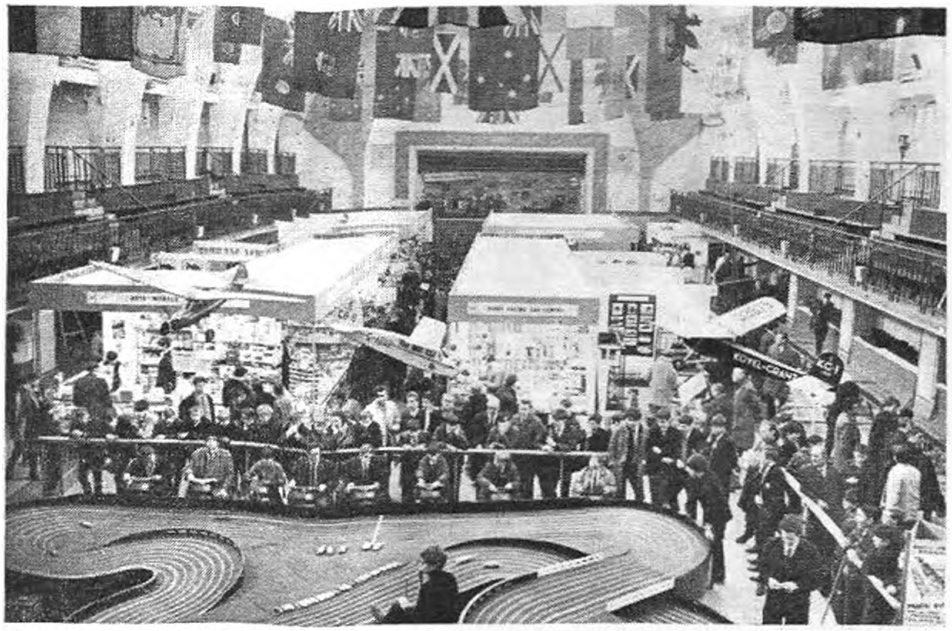
(PROVISIONAL)

March 24	*F.A.I. Glider (K. & M.A.A. Cup		Area
	Open Power (Frog Snr.)		Centralised
	‡Open Rubber		Venues
April 21	*F.A.I. Power (Halfax Trophy)		Area
	‡Open Rubber (Gamage Cup)		Centralised
	Open Glider		Venues
April 21	Control-Line Trials		
June 2	*BRITISH NATIONAL CHAMPIONSHIPS*		
	‡Open Rubber	(Model Aircraft Cup)	
	‡Open Glider	(Thurston Cup)	
	Ladies R/G/P/	(Women's Cup)	
	Tailless	(Lady Shelley)	
	R/C Multi	(S.M.A.E. Trophy)	
	R/C Scale	(Radio Modeller Trophy)	
	C/L Scale	(Knokke No. 2 Trophy)	
	Jnr. R/G/P	(Frog Jnr.)	
	‡A Team Race	(R.A.F.M.A.A. Trophy)	
	C/L Aerobatics	(Gold Trophy)	
	Handicapped speed		
	Combat		
	R/C Pylon	(Evening event)	
	Rat Race	(Afternoon event)	
	Navy Carrier		
	Mouse Race	Supplementary evening events	
	Unorthodox		
June 3	‡Open Power	(Sir John Shelley)	
	Wakefield	5 flights	
	F.A.I. Power		
	A/2 Glider		
	‡A Power		
	F.A.I. Team Race (Davies "A" Trophy)		
	Navy Carrier, Weston	Conclusive Flights	
	R/C Multi		
	Combat		
	Rat Race		
June 16	*Wakefield	(Weston Cup)	Area
	‡Open Power	(White Cup)	Centralised
	Open Glider		Venues

R.N.A.S. YEOVILTON

July 7	*Team Glider	(Model Engineer Cup)	Area
	‡F.A.I. Power	(Astral Trophy)	Centralised
	Coupe d'Hiver		Venues
July 7	C/L and R/C events		Centralised
August 11	*Team Power	(Keil Trophy)	Area
	‡Wakefield	(Gutteridge Trophy)	Centralised
	A/1 Glider		Venues
August 11	R/C events		Centralised
August 18	All-in Scale Meeting		
August 25	*Team Rubber	(Farrow Shield)	Area
	*F.A.I. Glider	(S.M.A.E. Cup)	Centralised
	‡A Power		Venues
September 8	C/L events 1st R/C Trials		Centralised
September 7-8	Free Flight Trials (Aeromodeller Trophy)		
September	*Southern Gala*		
	Open Rubber	(Flight Cup)	
	Open Power	(Short Cup)	
	Open Glider	(Pilcher Cup)	
	‡A Power	(Quickstart Trophy)	
	Chuck Glider		
	R/C Multi	(Aeromodeller Trophy)	
	‡A Team Race		
	"B" Team Race (Davies "B" Trophy)		
	Combat		
October 5-6	2nd Free Flight Trials		
	2nd R/C Trials		
October	*Northern Gala*		
	Open Rubber	(Caton Trophy)	
	Open Power	(Hamley Trophy)	
	Open Glider	(G.M.A. Cup	
	R/C Multi	(Teplin Trophy)	
	‡A Team Race	(Budapest Trophy)	
	"B" Team Race (E.T.A. Trophy)		
	F.A.I. Team Race (Wharfedale Trophy)		
	Combat		
	C/L Aerobatics		
	Rat Race		

Denotes Plugge Trophy event.
‡Denotes Free Flight Individual Championship event.

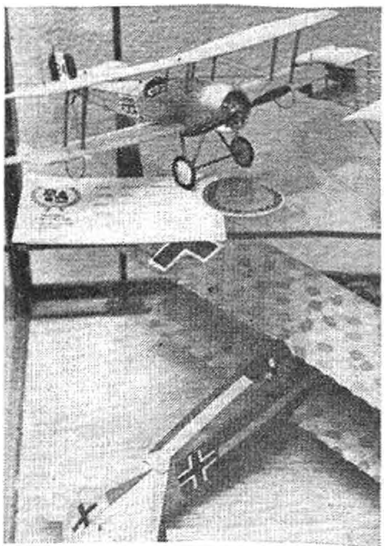


General view of Seymour Hall with Noel Barker's vintage types suspended over the A.M.F. slot track. Trade stands in background, model exhibits surround hall.

SUPER SHOW

1968 Model Engineer Exhibition

Seymour Hall
London
Jan 3 - 13th

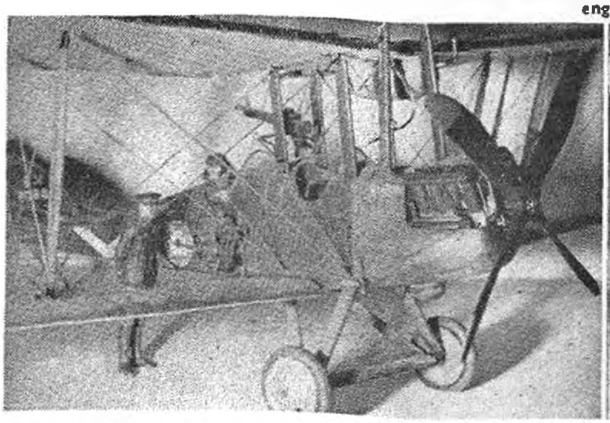


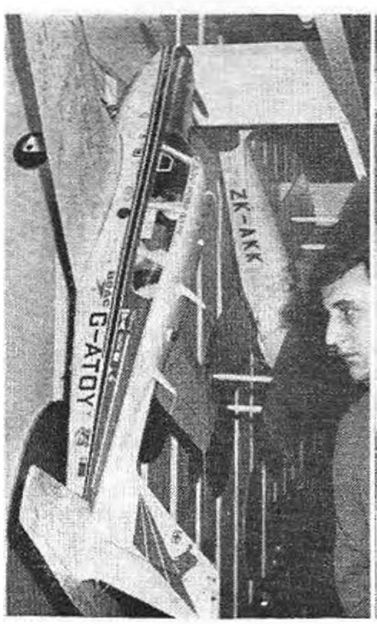
THIS was essentially a *scale* model exhibition, no matter what one's interest, nautical, steam, mechanical or aeronautical and apart from the vintage models loaned for exhibition by Noel Barker and Lt/Cdr. Alwyn Greenhalgh, practically all the entries in aircraft classes were scale types. They ranged from the tiny Seimens W.W.1 fighter to the big Comanche and covered the whole spectrum of scale aircraft, introducing a few new ideas. As one entered the hall, the decorative facia with its display of flying scale models imparted a lasting impression. Mick Charles' replica of Sheila Scott's Comanche was alongside John Bertola's Gipsy Moth in Francis Chichester's colours and a pace away was Colin Foster's green Moth with Amy Johnson's "Jason" registration. These pioneer aircraft subjects were a fitting entrance introduction to what was a most successful exhibition on all counts.

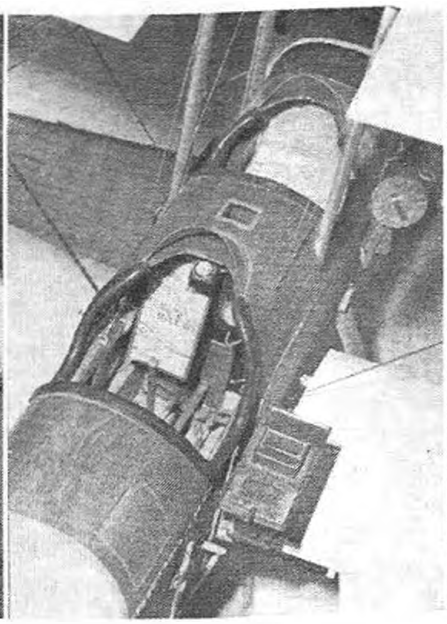
Tony Clements had a field day, collecting awards with each of three entries, made to a standard that drew many a sigh of admiration. The intricacies of some exhibits demanded long study, particularly in the "solid" scale section. Rigging wires (44 swg

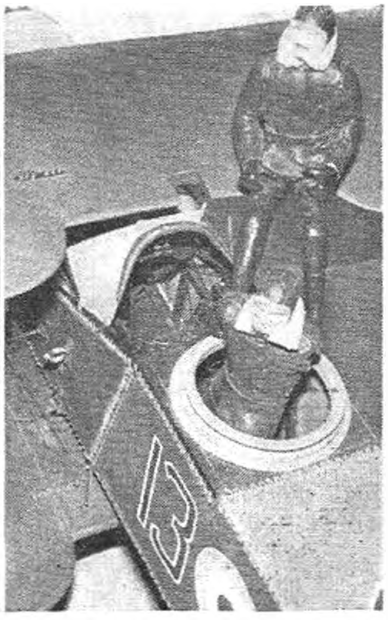
Left, A. F. Clement's magnificent Bristol Scout won a Bronze medal in Bristol Cup, tissue covered over scale structure, detailed rotary engine. It is above Peter Halliday's 1/16th Fokker D.VII of metal and wood construction, six months of work with hand painted lozenge camouflage.

Bottom left, Bill Hearne's BE 2e in Plasticard with carved figures to 1/24th scale, an achievement in realism from all aspects. Below right, is John Bertola's white Gipsy Moth in Francis Chichester's markings, well detailed with dummy engine.









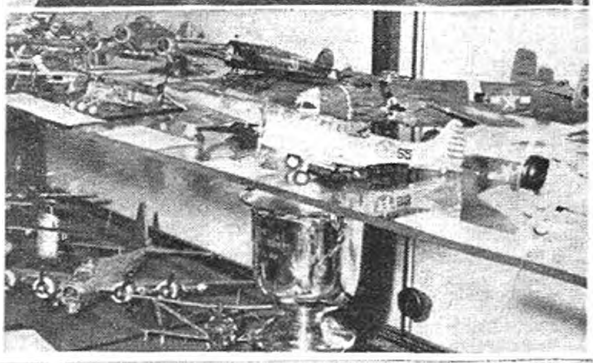
Lost in admiration for the Piper Comanche by Mick Charles, this visitor like so many others took time to absorb the inscriptions and interior furnishing of the Championship winning aircraft model, also winner of the Exide & Drydex Cup.

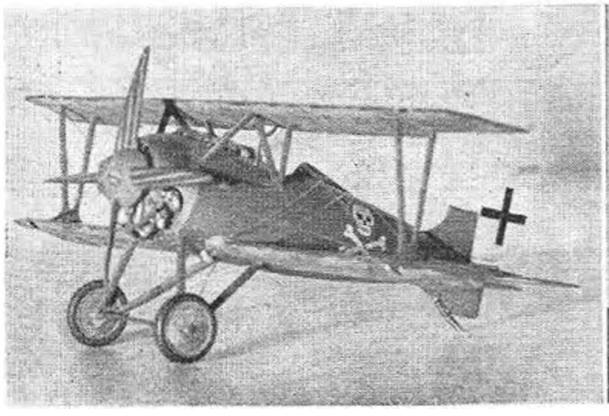
A.F. Clement's B E 2e (see cover) like his Fokker EIII had full cockpit fittings including Maps. Note camera and gun on side. At right, Bill Forrester's F2b won Bristol Cup, had leather clad crew, laced covering etc.

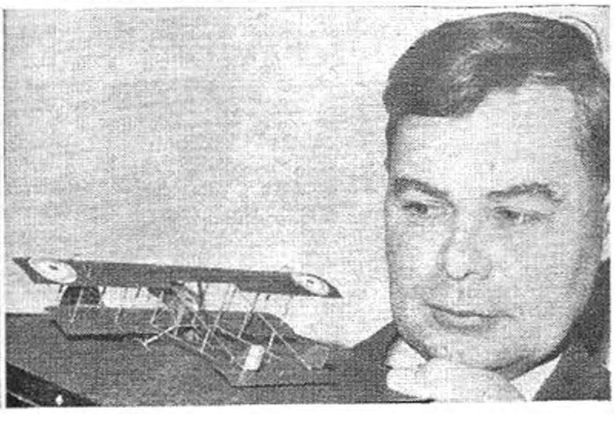
copper) on W. A. Vandersteen's Maurice Farman "Shorthorn" defied ones comprehension. And how on earth could Bill Hearne have made those superb 1/24th models out of Plasticard? To attempt to differentiate between the endeavours of these modellers would be grossly unfair. The skills of such craftsmen are such that they *all* deserve a prize. How nice it was too, to welcome back a veteran among scale modellers—H. J. Towner who not only collected an award for his Cessna Skymaster twin, but was also kind enough to loan others from his collection. 31,000 saw the show despite the snow that crippled our traffic system. Next time? Of course there'll be a next time—same time, same place: but with bigger space and more prominence for model aircraft.

Right top, Lightning F6 in part dismantled state by F. C. J. Leach had practically everything working despite 1/32nd scale. Note Jet engine, armament and cockpit.

Part of the fine display by I.P.M.S. included their Trophy for National Champion and the Inpact Bristol Bulldog by Fred Henderson which won it. Bottom left is George Haddow's amazing 1/72nd Siemens—Schuckert Right is W. Wandersteen and his Maurice Farman Shorthorn. Top static model with intricate rigging, and cockpit detail.

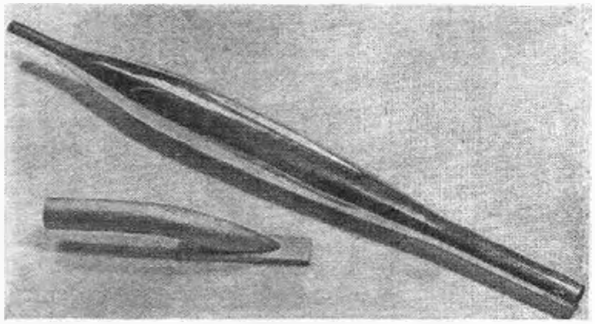






Britain First!
The E.D. POWER PIPE

TUNED EXHAUST FOR 2.5 - 3.5cc ENGINES TESTED FOR FREE FLIGHT OPERATION



The E.D. "Power Pipe" tuned expansion chamber and its manifold. Other sizes are to follow this fine lead by Electronic Developments. Pipe costs £2 9s. 6d., Manifold is 12s. 9d.

By A. T. Cheesley

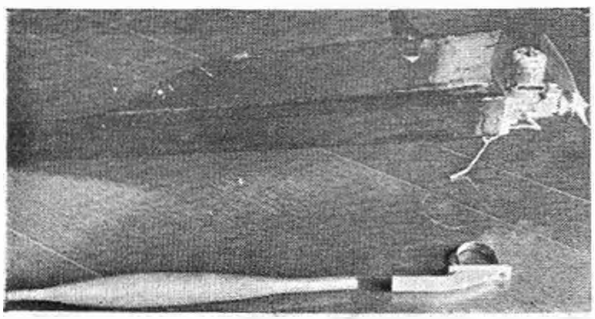
I IMAGINE that my reactions on being offered the chance of testing the new Kevin Lindsey designed Power Pipe would be similar to those of any free flight power enthusiast seeking more duration by having greater R.P.M. available during the climb. Like others, I have toyed with the idea of fitting a tuned pipe, but have rejected the thought as all the articles I have read on the subject state that pipes do not work with engines having sub-piston induction. However, the three page set of instructions supplied with the pipe leaves one in no doubt that the pipe works with any motor and fuel combination, and the object of this test was to check the validity of Kevin's claims on my own completely unmodified Super Tigre G.15. Before proceeding, it must be stated that no attempt was made to optimise the output, but this can be done easily by following the instructions given by Kevin. It is therefore emphasised that the pipe was tested in exactly the condition that it was found on unpacking from the stout cardboard container supplied.

ED Power Pipes are made in several sizes to suit varying engine capacities. This test was on Size No. 1 and has been designed for use with diesel and glow motors of 2.5 to 3.5 cc. capacity. This particular pipe is said to weigh about 1¼ ozs., but this figure will increase as various fittings are employed to fit the pipe to the engine. As an example, my own assembly weighs 2½ ozs. The assembly is made up of two components, and consists of an aluminium pipe which fits into a cast alloy manifold. Incidentally, the pipe may be purchased without manifold if this is thought preferable. My own recommendation is that the complete assembly is purchased as few will be able to fabricate the necessary manifold, and in any case, you will be in business much quicker if the production manifold is available. The assembly is about 14⅝ inches in length, and has a maximum diameter of 1⅛ inches, and appears slightly unconventional in having curved tapers instead of the usual straight tapers for the convergent/divergent ducts.

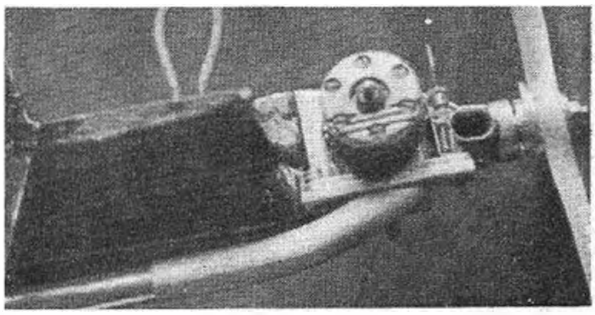
To enable the pipe to be fitted, it is necessary to make up a strap to attach the manifold to the engine and another to support the rear of the pipe to some part of the model. The supplied manifold has a plain face, so in the interest of a good gas seal and to prevent the possibility of the pipe coming adrift on D/T, a special adaptor was used between the manifold and exhaust stack. Fortunately, I was able to use the fittings from a now discarded silencer, and after drilling clearance holes in the manifold, the pipe was bolted to the model. If more than a degree of left thrust is used, a snag might arise at this point as the pipe will not lie parallel to the pylon; but will project an unreasonable amount. Whilst this position will not detract from the pipe performance, it is conceivable that unless substantial rear straps are used, vibration problems are possible, and in any case, it certainly looks ridiculous. Therefore, the pipe must be bent or the manifold/exhaust stack must be angled. Not wishing to alter the pipe in any way as it might have an adverse effect on performance, I chose to get busy with a file. Obviously this particular trouble will not arise if your model does not use left thrust. The assembled pipe is shown on the model in the accompanying photographs, and it can be seen that the tin plate rear support was easily mounted on the pylon of this particular model.

The fuel used in the test was an 80/20 methanol mix, and the R.P.M. figures given by audio tachometer. The test was conducted in near Artic weather, which could have easily lead to small tuning discrepancies due to frozen fingers and the desire to get back home in front of a fire as soon as possible. The figures given show the static R.P.M. and whilst it would have been informative to have given the in flight revs., some idea of the percentage increase to be expected in the air, can be extrapolated from the static R.P.M. shown.

With strap on the Manifold the unit is ready to fit for initial tests without any attempt to tune the length of the pipe.



Close up of the attachment to Super Tigre G15 using a strap around Cylinder block. Pipe is a push fit on to Manifold.



Complete installation emphasises the downthrust angle. It is essential to support the Pipe at the extreme rear.

The operating difficulties are surprisingly few, and certainly justify the designer's claims that this particular pipe is easy to use. The initial setting difficulties lead to the crankcase being flooded twice, but once the needle valve setting had been found even the lack of port priming facilities did not prove a handicap. In fact, hot starts were achieved at first flick, and it can truthfully be said that I had more difficulty starting without the pipe than I had with it. However, this may have been due to the adverse weather conditions, the standard FAI fuel, and possibly that the pipe retains heat. Once the engine is running, needle valve position is not at all critical, and revs. can be maintained over a wide range of needle settings. Surprisingly, there is no "peak" on the pipe and it does not go "in" or "out" with microscopic alterations in needle settings, but I did find a worthwhile increase in R.P.M. after allowing the engine to warm up for a short time. You may find that the fitting of a pipe will necessitate a modification to the grip on the model, and it is well to remember that the front end of the pipe gets fairly hot.

The average user of the ED Power Pipe will be interested in the performance increase only, but a side effect is in a noticeable reduction of noise. Although a Dawes Noise Meter was not available and therefore a scientific evaluation not possible, the pipe does remove some of the high frequency notes and is therefore less liable to give offence than an engine used with an open exhaust.

To summarise, the ED Power Pipe is well worth using and gives a substantial increase in power output which will undoubtedly overcome the slight weight penalty involved. For the perfectionist, and particularly for the FAI flyer, it would be advantageous to build a model slightly lighter than normal so that the all up weight with a pipe fitted meets the minimum FAI requirement. If the pipe is to be fitted on your current model the weight penalty might need adjustments to the CofG position or trim settings. It is to be regretted that the manufacturer does not supply a manifold to suit a particular engine, as it is thought that the sport flyer does not require the extra power given by the pipe, thus the purchasers of this latest ED product will be competitive types. In view of the very limited number of competition motors, it is hoped that the manufacturer will have second thoughts on this matter.

TABLE OF RESULTS

Prop	R.P.M. with Pipe	R.P.M. without	R.P.M. Gain
8" ×4" Top Flite Nylon	20,050	17,850	2,200
210×90 mm. MVVS Wood	20,750	18,100	2,650
7" ×4" Top Flite Nylon	21,780	19,800	1,980
7½" × 3½" Rev-up Wood	21,950	19,500	2,450
7½" × 3½" Super Record Wood	22,050	20,000	2,050

N.B.—*Pipe tested as supplied and no attempt made to tune on a particular R.P.M./propellor combination*

Tuning for Optimum Performance

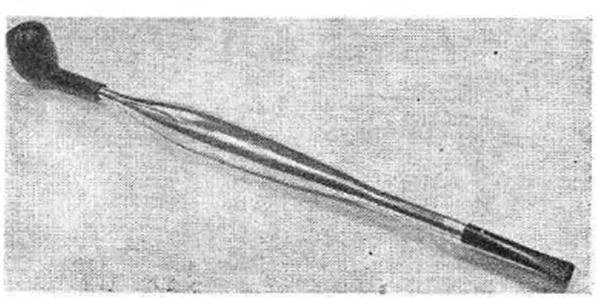
After completing the original test on the ED pipe it seemed a natural progression to tune the pipe for free flight use. By following the excellent instructions the pipe was cut out to give 24,000 r.p.m. This operation gave a certain amount of trouble as it was not realised that the straight portions of the pipe and manifold were not, on this example, of constant internal and external diameter respectively. Hence a considerable amount of fitting was necessary to obtain a fit of the two parts. When finally fitted, the two parts were made structurally solid with Plastic Padding, and after allowing a reasonable setting time, the pipe was refitted to the model.

So that every possible help could be given to the pipe to achieve the revs. required a 7 x 4 Top Flite nylon propeller was fitted and a 55 per cent nitromethane fuel was used. Starting proved more difficult than when using the standard pipe, but not unduly so, and soon the motor was running but quite obviously not very fast. After adjusting the needle valve, the pipe suddenly came "in" and the motor peaked impressively. It was apparent that the pipe was critical to minute adjustments to needle settings, and if used for competitions care will have to be taken to ensure that the motor is properly warmed up and the pipe "in" before launching the model.

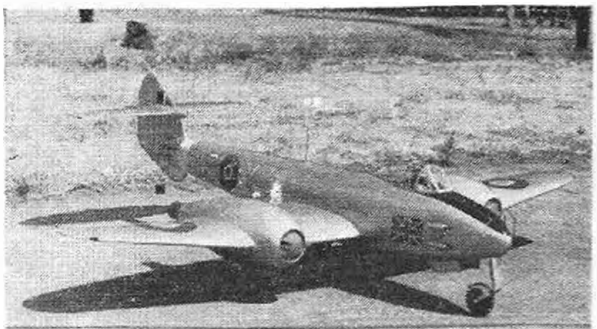
Unfortunately tachometer readings were not taken during this run, as a subsequent attempt to re-start showed that something was seriously amiss with the motor. Stripping showed that the big end had suffered badly due to the ingress of foreign bodies. The moral here is to ensure that the pipe is absolutely free of filings after carrying out the modification process. However, it can be confidently stated that the desired revs. were not only obtained but **exceeded**, so it would be as well to cut the pipe progressively and test rather than achieve the desired result in one operation.

One very noticeable side effect observed was that the motor became **very** hot, not only where it might be expected at the cylinder head, but at the crankcase also. The silencing effect of the modified pipe was quite obviously less than when using the unmodified version.

In view of the limited and inconclusive test it would be unfair to give any definite recommendations to the prospective user who wishes to modify the pipe, although it is certain that a considerable increase in power output is obtainable. Whether this increase is justifiable when judged against the operating difficulties and the possible decrease in engine life, is up to the individual.

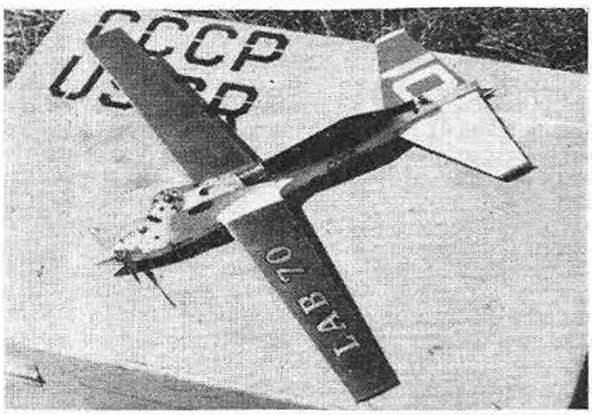


Peter Chinn reports that the Power Pipe has a fine secondary use. It gave a new lease of life to his fast Dunhill—real cool smoke!



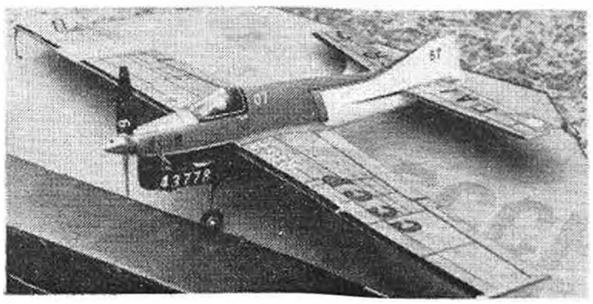
Control-line News

Above: Scale Meteor by L. Bazukov (U.S.S.R.). It is not inaccurate that he should have fitted propellers to EE 227 as the full size was the aircraft used for testing the unique "Trent" turbo prop installation. The colour scheme is wrong, however, as EE 227 was camouflaged without code letters YQ-Y of 616 Squadron.



Above is the latest speed design by Malanchuk/Lapinin, who are now using tuned length exhaust. The wings and exhaust pipe are made from Titanium Alloy 0.2 mm. thick. Below: Russian Nationals C/L scale winning AN-2 biplane. It was built by A. Chaevsky; it is extremely finely detailed and a deserving winner.

Below, from U.S.S.R., is one of V. Timofeev's Team Racing models using a Super Tigre G-20 D engine. His models are notable for their extremely fine line paintwork, detail, general overall finish and realism.



THE 1967 Russian Nationals, held at Kiev, saw the return of the Krasnorutski/Babichev team after four years' absence. They won F.A.I. Team Racing with a time of 9:35 using their customary modified Super Tigre G20D. Zoloteverch/Kobets were second at 9:42 and Stulov/Petriakov third with 9:43. The Stulov/Petriakov team put up the fastest heat with 4:41. All these times are exceptionally good (and close). All teams used in-flight fuel shut-off to determine landing position (a lesson learned from reading about Rat-Racing?) It would appear that tuned length exhaust pipes are giving complications as there were few entered in speed. First three in F.A.I. speed used Super Tigre G 20s with only slight modifications from standard. Speed was won by V. Malanchuk with a speed of 225 Km (140 m.p.h.). Stunt winner was Y. Sirotkin, with E. Kondratenko second and K. Plotsin third. (Like our own stunt results, the same names in the top places yet again!) A very highly detailed AN-2 biplane, built by A. Chaevsky won scale with a Gloster Meteor by L. Bazukov (see heading) second. This model uses two M.V.V.S. 5.6 cc. engines with conventional propellers (removed for static appearance). Although this model was very impressive, firing guns and having a bombing mechanism, the construction and detail were not of the quality of the winning model.

The sensitivity of the tuned exhaust was never more evident than at the Fesselfluglandesmeisterschaft 1967 Stuttgart. Rolf Miebach, the doyen of European rear tubers was in trouble and did not record a single flight, although pre-contest practice positively showed that he could have won this, and the previous Criterium. However, that was back in September and Rolf has learned lots more since. Frohlich has now pushed the West German 5 cc. speed to 266 Kmh (165.2 m.p.h.) using a *standard* Super Tigre G 29 R.V. with regular 134 degree exhaust timing (against the 150 degree mods on the G.15) a Lindsey KL5 pipe and Topflite 7 x 10 speed cut down propeller. Dave Balch and Goodhead entered Team Racing for the fun of it and wound up in the final at Stuttgart. In a whipfest, the Lutkat brothers came out top at 10:06, Wamper/Gorziza at 10:08 and the British pair at 11:04.

The French C/L Championships held on 23rd and 24th September, 1967, at the two circles of Auxerre showed a low entry in speed. Only one tuned length exhaust pipe was in evidence and speeds were relatively low, the winner being Jenatton with 208 k.p.h. (129 m.p.h.). Speeds were also low in F.A.I. Team Racing and in the first eliminator Magne was badly injured by a prototype epoxy propeller and obliged to retire. The Fabre/Favre team won with a time of 4:52. Their motor mount broke during the final but they pressed on to win despite severe vibration. French 5 cc. Team Racing follows F.A.I. rules but with maximum weight of 900 grammes (31.743 oz.), 30 cc. of fuel and races are run over 15 Km. Speeds again were low with Schevin/Souliac team winning at 6:08. Feminine entrant Régine Curt (Micron 15) has been flying Team Racers since April, 1967, and placed sixth at La Ferte sous Jouarre, yet *another* new French C/L circuit at its inauguration on the 1st October. Régine also reports for Infor' AmA in a lively way that shows no inferiority of her sex.

Incidentally Christian Coste established a 4:20 heat time with the new 7 cc. tank and the question is—is this a new record? Gerard Billon won F.A.I.

stunt over last year's champion Michel Souliac. Large engines are in vogue and sixty per cent used .45 cu. in. motors, and more than half are silenced (up to fifty per cent too few!)

New Japanese speed records were established at the "All Japan Contest" held at the Tokorozawa Army base of the U.S. Medical Corps on 15th October, 1967. T. Nakamura, using an O.S. Max H 60 (C/L version of Max H 60/RC) set up 265 Kmh (165 m.p.h.) in the 10 cc. class. In the 5 cc. class, A. Kusomoto and V. Kodaira both set up 258 Kmh (161 m.p.h.) using Super Tigre G21/29 RV motors imported from Italy, which is probably causing the Japanese engine manufacturers to think! No one is as yet using tuned length exhausts for aircraft in Japan. A few have been tried in boats but these have done little more than work as effective silencers according to our correspondent.

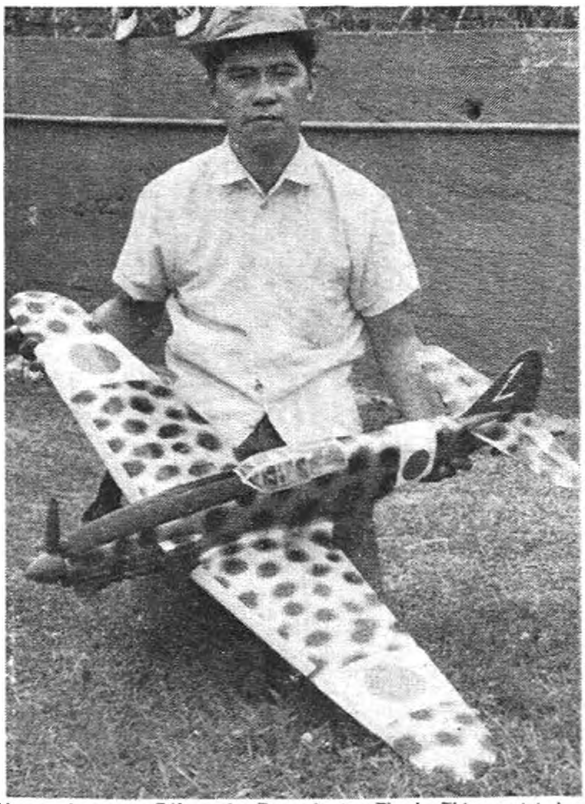
Polish Modellers congregate at the centre organised under the initiation of Stan Meuzie at Sosnowiecki, usually for a whole week of C/Line flying. At the 1967 meetings, the tuned exhaust feature became commonplace, Stan Skotinczny being among the first in the Polish field. His top speed was 201 Kmh (125 m.p.h.) using an unidentified engine—apart from its distinctive port side exhaust.

On the home front—yes there is some news (!) the major event of recent weeks has been the brain drain. Dave Platt to Top Flite. Dave Balch to Sikorsky. Geoff Higgs to Eastern Canada. Tom Jolley is co-opting new names to fill gaps in his C/L Sub-committee for the S.M.A.E. With Rat Racing coming along fast, Tom's new venture for a supplementary feature of the forthcoming Nats is MOUSE Racing—yes that's right—mini-rats! The R.A.F.M.A.A. lads cooked the idea up last September at Hullavington, kicked it around with .049 Cox's, etc., and now the tentative rules are: 2 x 35 ft. lines of .010 in. min., maximum engine capacity .09 cu. in., 120 laps for a heat (one compulsory pit stop) 240 laps and 2 pit stops for the final. There may be two classes, divided according to engine cost. How about taking up in preparation for the Nats lads?

Talking further of the Nats, scheduled for the first time at a Navy Station, the Fleet Air Arm are making available a Carrier Deck (with 8½ degree angle) to suit the AMA rules for the U.S. Navy Carrier event, for long a popular feature of many meetings, in the U.S.A. The 44 ft by 8 ft Deck will have arrester gear, "Island" and will be available for any subsequent major rallies and galas. Such generosity deserves support—so here's a summary of the rules as emphasised in the U.S. and likely to be used here:

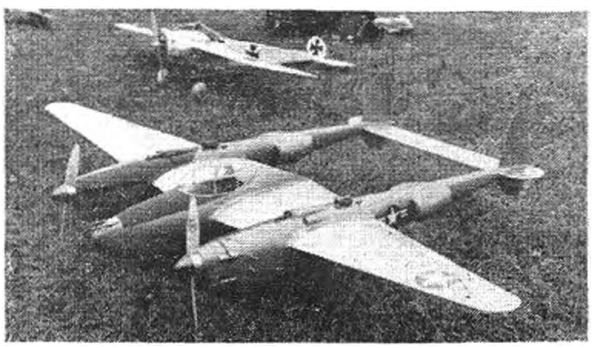
Class I Up to .40 cu. in. (6.55 cc.)
Class II Engines .41 cu. in. and over
Line length 60 ft 0.14 in. for 5-6.5 cc., 0.16 in. for larger engines
Model: Semi or Scale Navy type with arrester hook no longer than 1/3rd fuselage length. Max. Span 44 in.
Flight: Take-off Carrier, fly seven laps timed for high speed then decelerate for seven laps slow speed. Model to make arrested landing on Carrier deck.
Scoring: Scale models awarded percentage of 100 bonus points. High speed counts one point per m.p.h. Low speed counts three points per m.p.h. difference between high and slow speeds. Landing scores up to 100 points, etc.

How about starting your practice quickly? There are two Carrier Deck model plans already available M.A.N. 52A for the .60 powered "Skypirate" Douglas XTB D and M.A.N. 74A for the Bell XFL-1 "Airabonita". Each is 7s. 6d. plus 6d. for post from the editorial offices.



Above: Japanese C/L scale Tony is by Thori. This model has third line control to operate throttle on O.S. Max H 40 R/C. Below: Sleek speed model by Nakamura of Japan which is powered by O.S. Max H60R, set up the new Japanese speed record for 10 cc. models at the "All Japan Contest" with 165 m.p.h.

Below: Another scale C/L model from Japan in the shape of Lockheed P.38 Lightning by Y. Harada. Looks like a well detailed example of a popular subject.

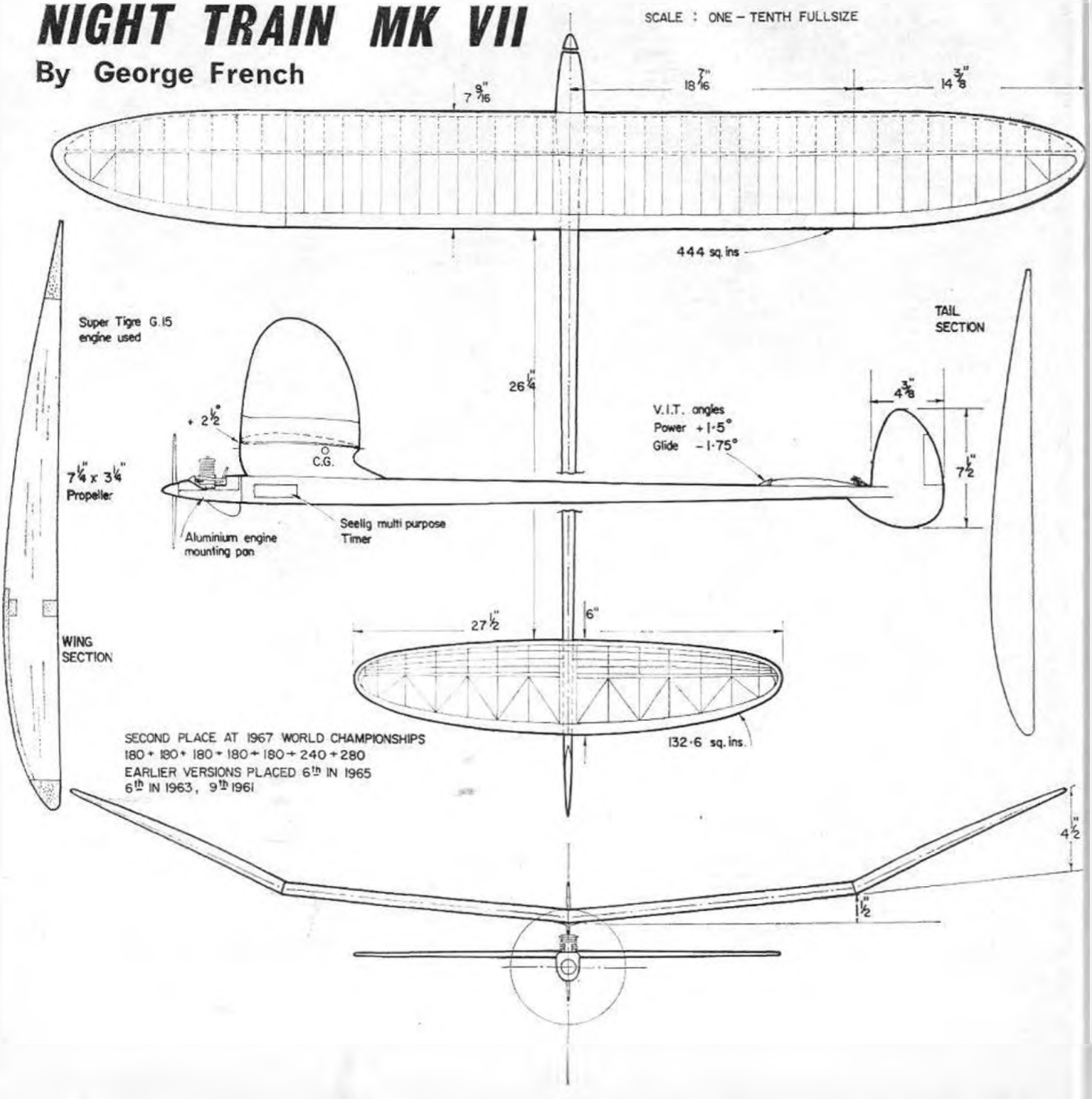


Championship Technicalities

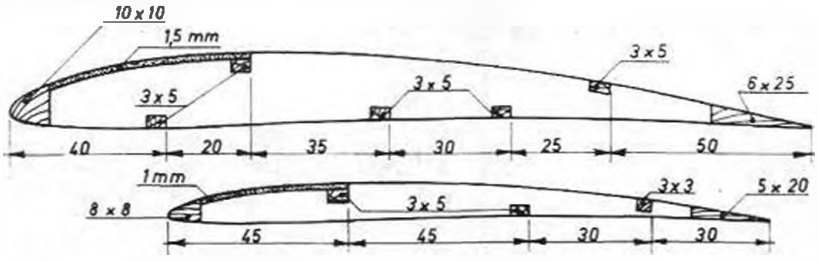
TWO POWER DESIGNS, 2nd & 3rd IN 1967 CHAMPS

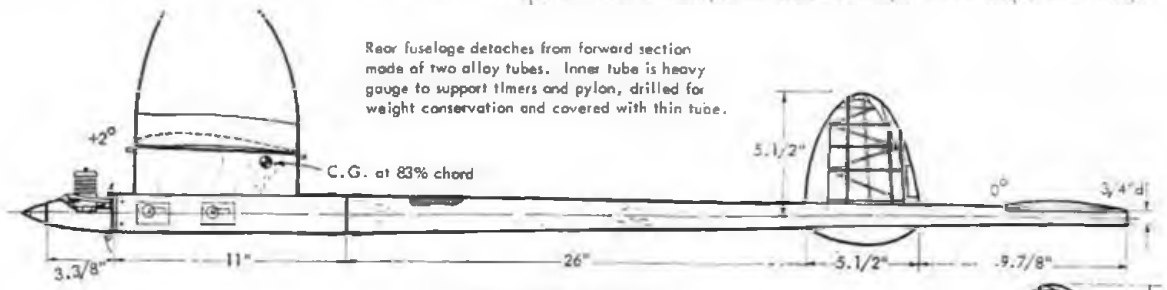
Over eight years of progressive development have gone into George French's *Night Train* and the result is a model that only rarely has flown less than the intended maximum. Refinements include a reworked Super Tigre G.15 (John West's was the one actually used at Sazena) mounted in a lightweight metal pan, and the Variable Incidence Tailplane to control the climb and trim the glide. Consistency of the Night Train in World Championships is emphasised by its high placings in the last four events, as well as the Zell-am-See International contests and British meetings. The Full-Size plan is due for publication later in the year in *Model Airplane News* and will subsequently be available through A.P.S.

At right George French launches with an eye to his Seelig timer, at Sazena.



Bruno Fiegl is as near an equivalent to George French as we know of in all Europe. He is Italian Champion, was runner-up in '66 and his models are impeccable. They also happen to be the most ingenious at the World Champs. A two thickness tube laminate carries timers, tank, pylon and receives engine and rear boom connections so producing as compact and detailed a piece of metal work as one can imagine. Moreover, the gliding characteristics of the design produce a performance that many acclaimed as the best on the field at Sazena. The airfoil and spar arrangement are reproduced from the Italian magazine *Modelli*.



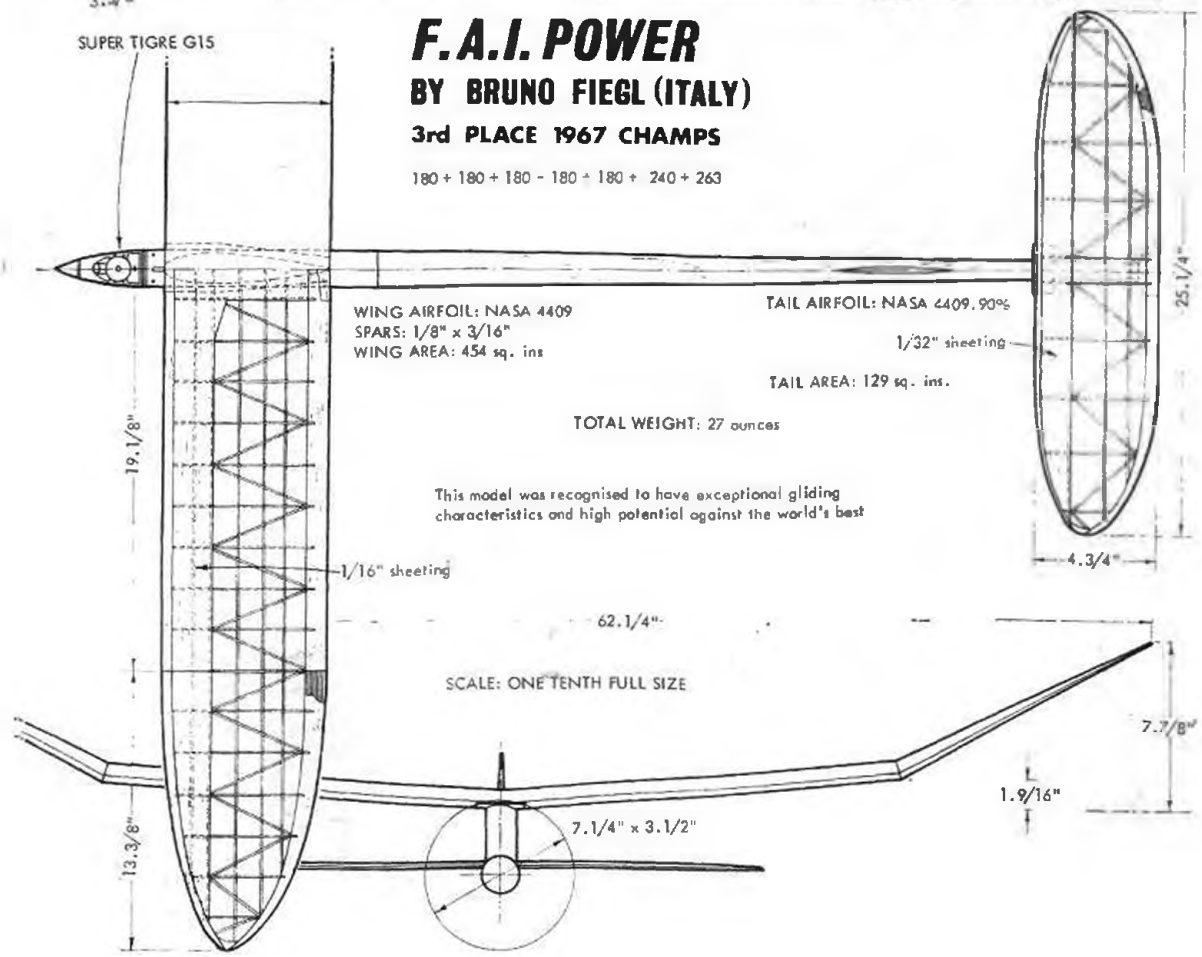


F.A.I. POWER

BY BRUNO FIEGL (ITALY)

3rd PLACE 1967 CHAMPS

180 + 180 + 180 - 180 + 180 + 240 + 263



Basic Aeromodelling

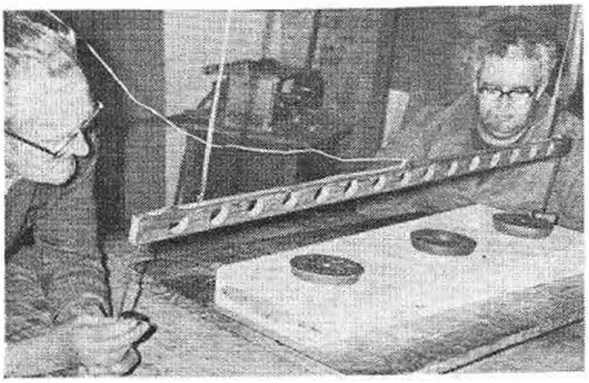
Part 14 of our Series

Foam Plastic Structures

QUITE a number of plastic materials can be turned into foams or what are more generally called "expanded" plastics—the expansion in bulk being the result of producing innumerable air bubbles dispersed throughout the material. Since the weight of air is negligible, expanded plastics have a much lower density than the original plastic. They are, in fact, a special type of man-made lightweight materials.

Some expanded plastics are rigid; others are semi-rigid or even "elastic"—like sponge rubber, for example. It is only the rigid foams which are of interest for aeromodelling structures, which virtually reduces the choice to two—expanded polystyrene and expanded PVC. Both yield rigid foams with a wide range of densities but so far, at least, only expanded polystyrene has been used for aeromodelling work, so only this material will be considered. For brevity, it is often called EP (expanded polystyrene) plastic.

Polystyrene in its solid form is the plastic used for making plastic kit mouldings, including thin shell mouldings for ready-to-fly models. It is very much heavier than solid balsa, weighing about 68 to 70 pounds per cubic foot, compared with 8 to 10 pounds per cubic foot for medium density balsa. When expanded with air bubbles its density decreases in direct proportion to the degree of "aeration" or void space introduced, so that EP material as light as 1 pound per cubic foot can be produced. At this density it is mostly air, but is still a rigid material with quite reasonable strength.



EP plastic is made by heating small pellets or beads of polystyrene which contain a volatile expanding agent. If a collection of such granules are enclosed in a simple mould and then heated, they will expand to fill the mould. The temperature required is quite moderate (about 90 to 100 degrees C) and usually supplied by introducing steam into the mould. The resulting density of the EP plastic then depends largely on the amount the pellets have been allowed to expand in the mould. For the very lightest densities the pellets are first pre-expanded before putting into the mould. Heavier densities are produced by limiting the degree of expansion (i.e., introducing more pellets into the same mould); and possibly by the addition of a certain proportion of "scrap" polystyrene.

Commercial mouldings for EP wings, fuselages, etc., are produced in this manner. Such mouldings may also be given a further treatment called "coining" in a second mould to melt and reset the surface skin of the original moulding. This gives a smoother and somewhat tougher skin. It is possible to buy pellets and produce your own mouldings, using steam heat, but this method is very little used for amateur construction. Even professionally made wing cores produced in limited numbers, as opposed to quantity production for a kit, are usually cut from solid "stock" EP material.

Solid EP material is produced in sheets in thicknesses from a few thousandths of an inch up to several inches. Thin sheets are used commercially for insulating underlays to wallpaper covering. Thicker sheets are used for insulating panels, or cut into squares or "tiles" for similar purposes. Probably the most familiar form is the EP ceiling tile of about 9 inches square and about half inch thickness.

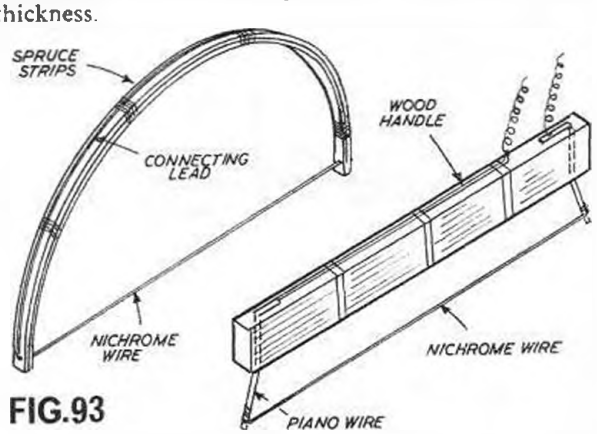


FIG.93

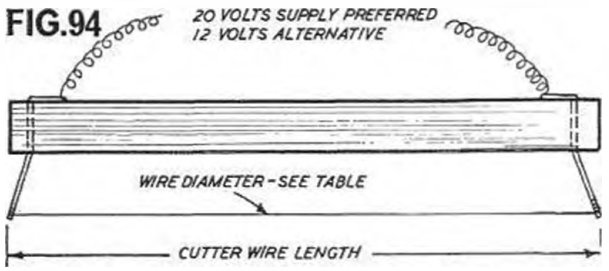
Larger and thicker sheet and "block" EP can be bought from builders' merchants or firms specialising in the supply of insulating materials. Neither the quality or density may be quite what is required for aeromodelling, however. Ideally, the best EP material for making large wing cores is 2 pound per cu. ft. density or *less*, produced from pellets with no scrap introduced. This is the most homogeneous type of foam and will be the easiest to work with.

Strength of the EP material will vary directly with the density, but strength is not the main considera-

Left: Aviette Kits are specialists in E.P. foam cores. Here a typical wing core is being cut using the wire bow as seen in photograph on opposite page. Note use of weights and the section template on E.P. block.

tion. EP is normally used only as a *core* material for making wings (except in the case of small models), and strength comes from cladding or covering the core. A denser and thus stronger EP core only adds unnecessary weight, and no greater overall strength.

Starting point for making an EP wing core, therefore, is a block of EP plastic of the lightest density and best quality available. The material is too crumbly to carve with a knife or cut with a saw and the only satisfactory way of working it is to cut it with a hot wire. You *can* use a piece of ordinary piano wire heated up to just below red heat, but that will be about as effective and accurate as shaping a block of balsa with a drag saw used for tree felling! You need to make up a special bow with an electrically heated wire "string" so that the wire can be heated to a suitable, and consistent, temperature.



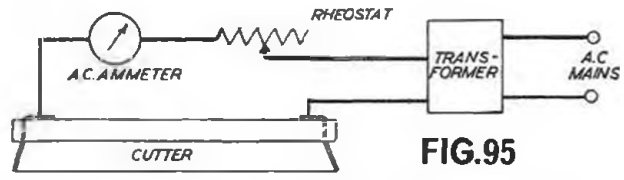


FIG.95

Fig. 93 shows two possible designs for an EP cutter. Bear in mind that the bow "string" or cutting wire must be longer than the longest length of EP block you are going to cut—*i.e.* at least a couple of inches longer than the semi-span of the wing for cutting wing cores.

The "string" of the bow should be nickel-chrome (nichrome) resistance wire ideally "loaded" to about 50 to 60 watts. This means a bit of experimenting to find the best wire diameter for the length of wire used (which will govern its electrical resistance), to match the voltage to which the wire is connected for heating. Mains voltage is much too high—*and much too dangerous*—so connections to the bow element must be from a mains transformer, or possibly a car battery.

Best results are obtained using about 20 volts for heating *(Fig. 94)*, so to supply this you need a mains transformer with a 20 volt output. Note that you do not need a transformer/rectifier unit. A transformer only will do as the wire will heat up just as readily under AC as DC current (it is really working just like a low voltage electric fire element). With 20 volts supply available, then 24 or 25 swg nichrome wire should be about right for a bow length of 48 in. If you are "stuck" with a 12 volts supply (a 12 volt mains transformer, or a 12 volt car battery), then try 20 swg nichrome wire. The table gives some further data on this particular subject.

80/20 NICKEL—CHROME HEATER WIRE SIZES
(to give 50–60 watt loading)

Length of Wire	*12 Volts Supply Wire Size S.W.G.*	*20 Volts Supply Wire Size S.W.G.*
6 in.	31	36
12 in.	27	33
18 in.	25	31
24 in.	24	29
30 in.	23	27
36 in.	22	26
42 in.	21	26
48 in.	21	25
54 in.	20	29
60 in.	20	29

This set-up is still far from ideal as you may find the wire gets too hot, or is too cold, for efficient cutting. Also for different lengths of bow you would need to adjust the wire diameter to compensate. If you are contemplating a reasonable amount of work with EP material, therefore, it will pay:

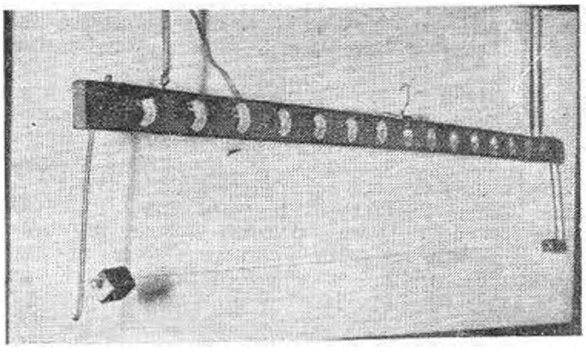
(i) To use a 20 volt output transformer to start with

(ii) Incorporate a rheostat or variable resistance in the circuit so that you can vary the actual current fed to the cutting wire. (Make sure that this has a working rating of 200 watts or more). see *Fig. 95*.

(iii) Also include an ammeter in the circuit (AC ammeter if you are using a simple transformer) so that you have a calibration for the setting of the rheostat. This latter feature is not essential, but it can help a lot if you want to switch from one size of cutter to another when you can find the best "amps" setting in each case and mark on the particular cutter.

To cut a wing core you now need templates of the root and tip ribs. These should be cut from $\frac{3}{32}$ or $\frac{1}{8}$ in. plywood, pinned to each end of the EP block, as shown in *Fig. 96*, using long wire nails. The EP block, of course, is first cut to exact length (using the bow cutter). You will have to experiment first on a piece of scrap EP to adjust the wire temperature for efficient cutting.

To do the actual cutting the bow is then drawn across the wing section, rubbing on each end template, as shown in *Fig. 97*. If the panel is longer than about 3 feet this is definitely a job for two operators—one holding each end of the bow—although you may manage single-handed, with practice Having cut one surface in this manner, turn the block over and cut the other surface. That's



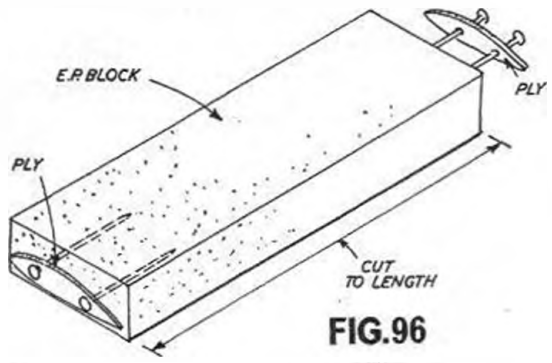


FIG.96

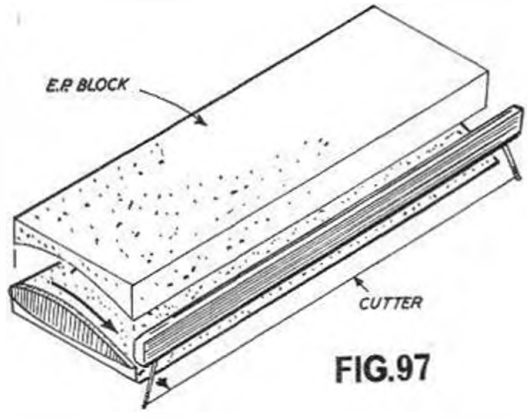


FIG.97

the complete core cut out in two simple operations. Much quicker than carving solid balsa—but it *is* a lot trickier. There are lots of things which can go wrong!

For instance, if you cut too *slowly*, or the wire temperature is too high, the surface of the E.P. will melt too much and shrink away from the cut line, probably producing a series of ridges. If the wire temperature is not hot enough you will almost certainly produce a ridgy cut, and possibly tear lumps out of the surface. If the wing is *tapered* in planform, cutting is even trickier, for to produce a smooth cut you need to advance the cutter fast towards the leading edge of the tip rib, then faster over the root rib template than the tip rib template so that you end up at the trailing edge of each template at the same time. If not, you will probably have a wavy trailing edge instead of a straight one.

It needs quite a bit of practice—and experimenting with different wire temperatures—to produce really first class cutting results. However, do not worry too much. Even a "rough" core may be quite usable as it is normally covered with veneer or balsa sheet to finish.

You may need some other shaping to be done on the cut core, such as a slot or recess for an undercarriage spar, or a cut-out to take an actuator, as well as having to chamfer off the root at the required dihedral angle. Small straight cuts can be made satisfactorily with a razor saw. You can, however, easily make up small cutters for other shapes, using a length of nichrome wire mounted on a Paxolin handle; or even copper wire wound around the tip of a large electric soldering iron—see *Fig. 98*.

For joining wing panels it is not necessary to use a ply stub spar or dihedral keeper, although this is sometimes done. If so the spar slot is best cut with a razor saw as this will usually produce a better parallel slot than a wire cutter. Adequate strength is usually given, however, by gluing the two panels together with a simple butt joint and then reinforcing the joint with a wrapping of thin glass fibre cloth or nylon or terylene fabric cloth, again using a suitable adhesive. *Fig. 99*.

Choice of adhesives suitable for use with EP plastic is quite limited. Plastic cement (polystyrene cement) is out since it simply eats away the material. Balsa cement will not stick at all, but may dissolve away the plastic (some EP foams are rapidly dissolved by cellulose, others not). Contact adhesives (like Evostick) and glass fibre resins dissolve EP into a pulpy mess. The only suitable materials are water-based or similar types, so take your choice from the following:

Water soluble glues—like Seccotine—can be used but since they are water soluble are little used. There are plenty of better adhesives.

PVA or "white" glue—probably the best general the best general purpose adhesive for EP plastics, but remember PVA is not a *waterproof* glue. It would be of no use for attaching fittings to EP plastic floats, for example. Main limitation is slow drying time.

Latex adhesives—generally excellent for use with EP plastics, particularly for applying veneer covering. A recommended type is "Copydex"—fast setting because it is a contact adhesive.

Synthetic resin adhesives—UF resin woodworking glues, such as Cascamite or Aerolite 306 are excellent for use with EP plastics, producing strong and waterproof joints. They do, however, need at least 24 hours to set properly.

Expanded polystyrene adhesives—a number of adhesives are produced specifically for use with polystyrene ceiling tiles, etc., and are equally suitable for aeromodelling work with EP. A typical trade type is "Styro-Bond".

(To be continued)

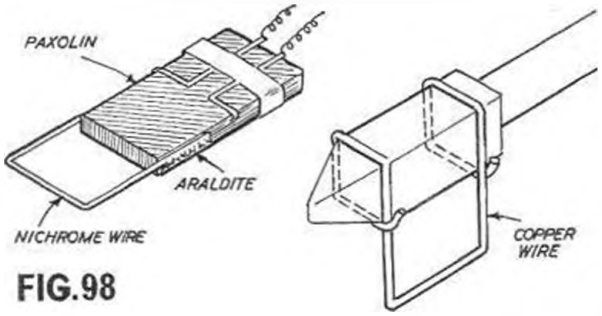


FIG.98

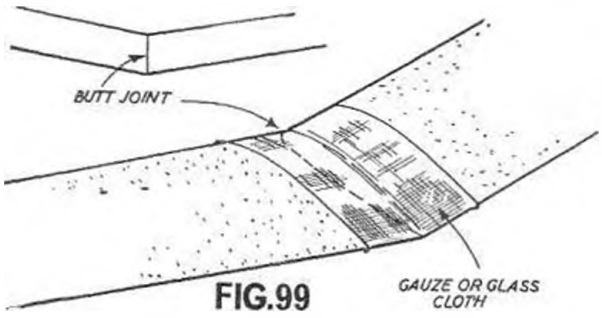


FIG.99

Why not join this grand junior Aeromodelling Club?

Dear Sir,

I enclose with this letter an application form for membership to the *Golden Wings Club* and a 2/6d. postal order.

I have just finished a *Keil Kraft Topper*. I would like to colour dope my model but on the instruction sheet it only mentions colour doping the inside of the cockpit and the endplates of the tailplane. Could you tell me if it would be all right to colour dope part of the wings and fuselage.

Sedgley, Worcs. *B. Weaver*

It is not advisable to colour dope your Keil Kraft Topper all over as this will add a considerable amount of weight and produce a loss of performance by increasing the wing loading. (As the model weighs more with the same wing area, the loading in ounces per square inch must increase.) You could use coloured tissue, as this would not increase the weight. This is not usually supplied in the kits but can be obtained from most model shops.

Dear Sir,

This is the first time I have written to the *Golden Wings Club* since I became a member. My problem is that I wish to purchase the *O.S. Pixie* single channel receiver and transmitter and the *Keil Kraft Mini-Super*, and I am wondering if the *Webra Sport-Glo* 1.7 c.c. engine with the radio control carburettor would be suitable for the above combination. I have only just bought the *Webra Sport-Glo* and think its a fabulous engine. I do hope you will be able to answer my questions.

Guildford, Surrey. *D. Andrews*

The combination of the Mini-Super O.S. radio and Webra Sport-Glo 1.7 is an ideal set up to start off in radio control model flying with. This engine is powerful for its size and should give you many trouble free hours of operation.

Dear Sir,

Please could you tell me if the *Frog 150* diesel engine would be suitable for the *A.P.S. Mudhopper*, plan number PET 705. I have enclosed a stamped addressed envelope for your reply.

Harlow, Essex. *T. Parkinson*

The Mudhopper is designed to take .75–1 c.c. engines and the Frog 150 should be too powerful. If the propeller was fitted backwards and the engine run at low throttle you would find the excess power controllable.

Dear Sir,

The Champ was my first control line plane and when pranged, it was beyond repair. It seemed a shame to waste the wing which was not damaged so I converted it into a flying wing and it flew pretty well.

I am writing to ask if *Model Aircraft Plans* are still available. The one I am interested in is *Pic and Choose*, M.A. 04 which is a plan with two planes on it. Also would it be possible to use the Rebate plan purchase coupon on page 481 of the September edition in order to purchase this plan. I am a member of the *Golden Wings Club* I have been flying for about three years now. At the moment I have a *Keil Kraft Marquis* with a *P.A.W. 1.49* and a *Phantom Mite* with a *Wen Mac .049 Rotomatic.*

Rippondale, Halifax. *M. Holrayde*

Most of the Model Aircraft plans have been incorporated in the Aero Modeller Plans Service and our Illustrated Plans Handbook No. 1, (price 2|-). "Pic and Choose" is unfortunately no longer available. The special Golden Wings rebate coupons can be used on any plans order, but only one coupon per order.

Dear Sir,

I have a *Veron* control line *Spitfire* and I would like to know which engine you would recommend for it, would a *D.C. Sabre* be any good and can you get a silencer for it. I always try to obtain a copy of Aero Modeller and look forward to *Golden Wings* page each month. I did have a *Cox Stuka* until it crash dived on its first and last flight during its second-hand ownership with me.

Hong. Kong. *S. N. Pitt*

The D.C. Sabre is an ideal engine for the Veron "Spitfire". This is the largest size of engine you can use in this 27½ inch wingspan model A D.C. silencer can be used. If you are having trouble obtaining Aero Modeller *why not try a direct annual subscription? This costs 35|- per year including post from the editorial office.*

Dear Sir,

I have been a member of your club for about two months and this is my first letter to you. I have a D.C. Super Merlin .76c.c. and I would like to know if it would be suitable for a *Keil Kraft Champ*, and if it is not, what control line or free flight model would it be suitable for.

Uttoxeter, Staffs. *C. Parker*

The D.C. Merlin is ideal for the Keil Kraft "Champ" and you should fly the Champ on 30 - 35 foot lines. The kit includes basic flying instructions and should be ideal for you. A good free flight plan for this engine would be "Sharp Shooter" plan FSP 804 5|6d. inc. postage.

Questions and Answers

I have sometimes found I need a trim tab on one wing of my models, but find it difficult to make one which does not get knocked off or else splits the trailing edge if it is slotted into it. How can I fix one permanently?

A very effective way to make a trim tab for a wing is to use a piece of shaped trailing edge section cemented under the wing trailing edge with its tapered edge facing forwards. Experiment with a small piece pinned in place first, then when you find the most effective length cement it in place permanently; it will be strong, not get knocked and not bent to any different settings. Naturally you should use this under the wing which you wish to give more lift to, and remember that the nearer the tip you put it the more effective it will be, so that you will not need more than an inch or so at the tip of a wing about 30 inch span.

Dear John Bridge,

I am between 10 & 16 years of age and would like to become a member of the "Golden Wings Club". With this application I enclose postal order (International Money Order) for 2/6d. to cover cost of the enamel club badge, two coloured transfers and membership card.

NAME IN FULL .....

ADDRESS .....

.....

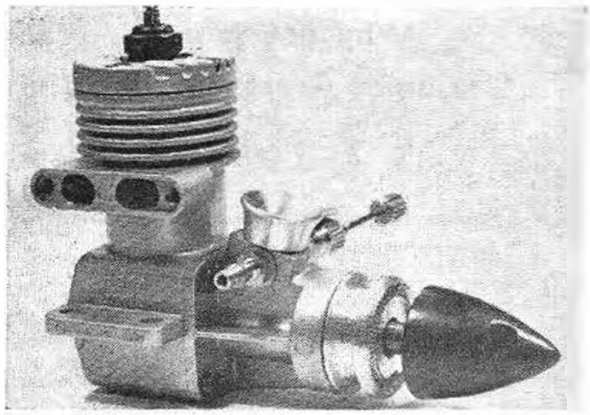
YEAR OF BIRTH .....**SCHOOL**.....

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

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

2d. in the 1/- Rebate plan purchase coupon for Golden Wings Members

3/68 G.W. No.....



ENGINE TEST by Peter Chinn

TAIFUN SPRINT 1.79cc

dual purpose engine from Germany

THIS NEW Taifun engine, the first for some time from the Hans Hoernlein factory in West Germany and first seen in prototype form at the 1967 Nuremberg exhibition, is now in full production and can be obtained in the U.K. through Ripmax dealers.

The Sprint's capacity of 1.79 cc. puts it into the same class as two other fairly recent small glowplug engines, the O.S. Max-10 (1.75 cc.) and the Webra Sport Glo (1.69 cc.). Like these, it is light, compact and powerful and is available in a throttle-equipped radio-control version. Unlike its competitors, however, it has its crankshaft carried in two ball-bearings instead of a bronze bearing and this, as one would expect, makes it a little more costly. We understand from the distributors that the Sprint will be priced at around £7 in the U.K. for the version described here and a little more for the R/C model.

Design and Construction

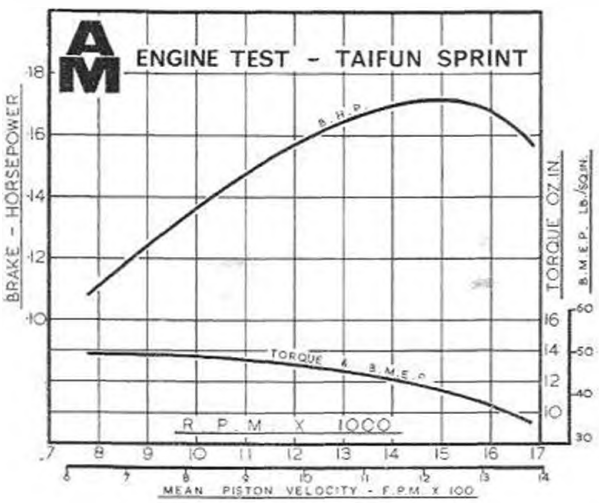
In design and construction the Sprint does not bear much resemblance to other current Taifun engines, all of which are diesels with the exception of the 3.6 cc. "Bison" model. In appearance, it is slightly unorthodox in the distinctive angular lines of its crankcase, but the Sprint's basic layout is conventional and includes shaft induction and a loop-scavenged cylinder. For the first time in a Taifun engine, a detachable front housing and a drop-in cylinder sleeve are employed.

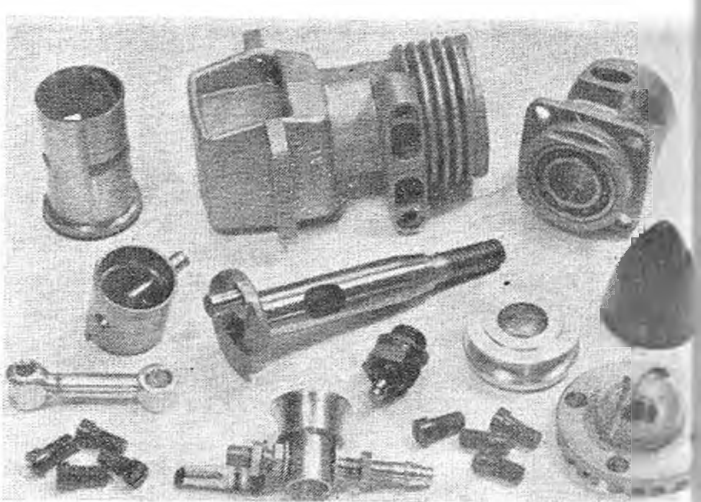
The main casting consists of the crankcase and cylinder casing in a single unit and embodying the usual beam mounting lugs, plus a wide exhaust duct to which a silencer can be fitted. The cylinder liner is of hardened steel and is a slip fit in the case. It has a flange at the top with which it is locked in place by the pressure diecast cylinder head. Unlike most modern engines, which now use soft copper or aluminium cylinder-head gaskets, an asbestos-based composition gasket is used. Such a gasket is perfectly satisfactory provided that the head screws are kept reasonably tight (and, of course, evenly tightened) and that the engine is not needlessly taken apart.

The crankshaft is of the crescent counterbalance type and has an 8 mm. dia. journal. It is carried in two ball bearings. These are the same size and type, front and rear, 16 mm. o.d. with 8 balls each, in brass cages and are fitted into a pressure diecast front housing which attaches to the front end of the crankcase by means of a rectangular flange and four screws. The housing incorporates the usual intake boss and this is bored 7 mm. into which is fitted a machined aluminium venturi insert having a throat diameter of 4.5 mm. It is retained in the orthodox manner by a brass spraybar.

At the front end, the shaft is reduced to a 5 mm. threaded diameter for the machined alloy prop retaining spinner-nut and, between the main journal and the threaded length, the shaft incorporates a taper on which a machined prop driver is fitted.

The piston appears to be of an inoculated cast-iron—the expected choice for use with a hardened steel cylinder-wall—and has a conventional flat crown with a straight deflector. It is not as light as some pistons in this type of engine, but obviously maintains an excellent fit within the cylinder bore, as was testified by the even wear pattern on our test engine. There is a lapped section above the gudgeon-pin hole centre, the skirt below this being relieved approximately .0005 in.





Performance

Our test motor, sent to us direct from Germany, was received without a glowplug fitted. After checking the engine on several suitable plugs, we chose the American K&B KB-1S as this gave the best performance.

Initial running-in was carried out on an 8 x 4 Tornado nylon propeller and using a standard fuel mixture containing 5 per cent nitromethane. The Sprint started quickly and proved to be simple to operate, with no unpleasant characteristics whatsoever. We used an exhaust prime to loosen the engine up and provide a good rich mixture when starting from dead cold. Thereafter, one or two flicks of the prop with the air intake choked were sufficient preliminaries to a quick restart.

We also tried the Sprint with the maker's silencer fitted. This is a straightforward expansion chamber type and attaches to the engine with two long countersunk screws which enter tapped holes in the end of the exhaust duct. No provision is made for priming through the exhaust port with silencer fitted. In this case, one can prime the intake instead and help the mixture on its way to the combustion chamber by turning the engine over, head downward.

The silencer made very little difference to the prop revs recorded up to 12,000 r.p.m. or so and only about 300 r.p.m. at the peak of 15,000 r.p.m. Typical prop r.p.m. recorded included 8,500 on a 9 x 4 Top-Flite nylon, 11,700 on an 8 x 4 Power-Prop, 13,800 on a 7 x 4 Top-Flite wood, 14,700 on a 7 x 4 Trucut and 15,400 on a 7 x 3 Top-Flite wood. All these figures were obtained on 30 per cent nitromethane fuel and this mixture was responsible for increasing b.h.p. at the lower end of the power curve by 8-10 per cent, rising to almost 20 per cent at the peak.

As the graph shows, the maximum power output we obtained under these conditions (i.e. no silencer, but on 30 per cent nitro fuel) was just over 0.17 b.h.p. at 15,000 r.p.m. It seemed highly probable, however, that the small choke area of the 4.5 mm. bore venturi insert, which is further restricted by the spraybar (2.8 mm. dia. where it passes through the venturi), was reducing top end power output quite a bit.

SPECIFICATION

Type: Single-cylinder, air-cooled, loop-scavenged two-stroke cycle, glow-plug ignition. Crankshaft type rotary valve induction. Twin ball journal main bearing.
Bore: 13.5 mm. (0.5315 in.) **Stroke:** 12.5 mm. (0.4921 in.).
Swept Volume: 1.789 cc. (0.1092 cu. in.).
Weight: 3.5 oz. (4.6 oz. with maker's silencer).

General Structural Data

Pressure diecast aluminium alloy **crankcase/cylinder** unit with drop-in hardened steel **cylinder-liner.** Pressure diecast aluminium alloy **main bearing housing** containing two 8 by 12 mm. ball journal bearings. Hardened steel counterbalanced **crankshaft** with 8 mm. dia. journal, 5.2 mm. bore gas passage and 4 mm. dia. solid crankpin. Lapped cast-iron **piston** with straight baffle and hardened 3 mm. **gudgeon-pin** having aluminium **pads.** Fully-machined aluminium alloy **connecting-rod,** unbushed. Pressure diecast aluminium alloy **cylinder-head** secured to main casting with four screws. Asbestos composition **cylinder-head gasket.** Machined aluminium alloy **prop driver** and **spinner nut.** Machined aluminium alloy 4.5 mm. bore **venturi insert** retained by brass spraybar type **needle-valve assembly.** Beam mounting lugs.

TEST CONDITIONS

Running time prior to test: 2 hours.
Fuel used: (a) 5 per cent pure nitromethane, 25 per cent Duckhams Racing Castor-Oil, 70 per cent I.C.I. Methanol (Running-in and preliminary tests).
(b) 30 per cent pure nitromethane, 25 per cent Duckhams Racing Castor-Oil, 45 per cent I.C.I. Methanol (dyamometer tests).
Glowplug used: K & B KB-1S platinum alloy filament, short-reach.
Air temperature: 51 deg. F.
Barometer: 29.35 in. Hg.

We decided to check this by removing the venturi completely. While it was doubtful whether the Sprint would then have sufficient suction to draw fuel at low speeds, there seemed a fair chance of it working out at the top end. This was, in fact, confirmed on test. We gained 600 r.p.m. on a 7 x 4 prop., 900 r.p.m. on a 7 x 3 and 1,900 r.p.m. on a 6 x 4. No actual torque tests were carried out with the venturi discarded but these and other prop/r.p.m. checks were sufficient to indicate a b.h.p. increase in the region of 35 per cent at a new peak of around 18,000 r.p.m.

As regards prop sizes, if one wishes to extract maximum power, the best size for the Sprint in regular trim would appear to be a fairly fast 7 x 4 or for a high performance free-flight model a fast 7 x 3 if the engine is used with a larger bore intake.

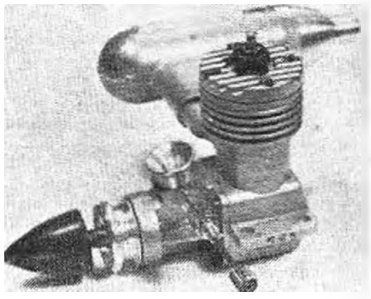
In all, the Sprint is a well made, nice handling motor of very good performance.

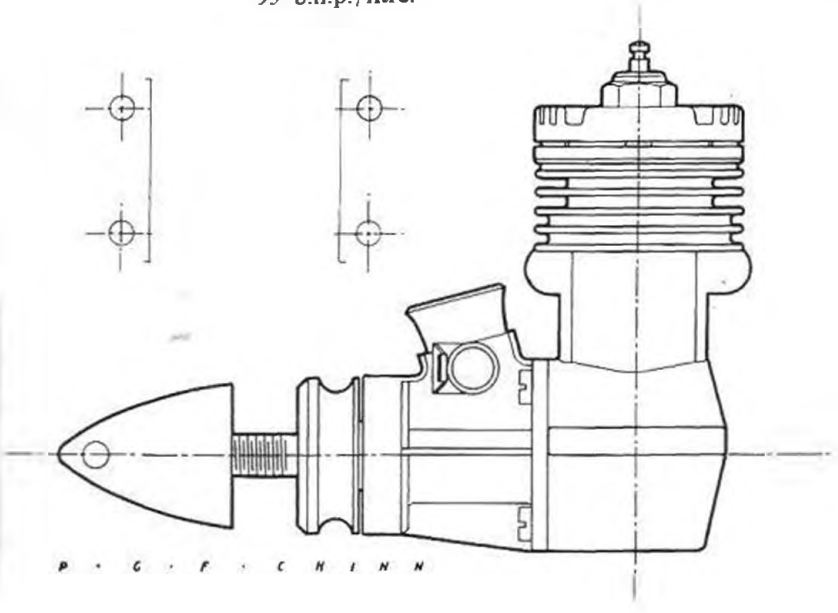
Power Weight Ratio (as tested, less silencer): 0.78 b.h.p./lb.

Specific Power Output (as tested, less silencer): 95 b.h.p./litre.

Unusual in a small glowplug engine, the Sprint features dual ball-bearing supported crankshaft.

Optional exhaust silencer for the Sprint has internal two screw fixing, seen fitted below.





TOPICAL TWISTS

by 'Pylonius': illustrated by 'Sherry'

You Just Can't Win

THE trouble about making any sort of point, however valid you might think it to be, is that the world is too full of contradictions. You go into sackcloth and ashes over the flying field situation, bewailing the plight of the stranded model flyer, and next thing you know some benighted club or other is advertising for members to keep the grass down on its five flying fields.

Much the same goes for the silencer problem. The beleaguered S.M.A.E., harassed on all sides to yield to the furore of the noise makers, gave up its much criticised silencer rule. But what happened? Was the Society overwhelmed by grateful well wishers, full of praise for this lifting of the dead hand of bureaucracy? Not a bit of it. All the clubs turned sanctimoniously nasty, proclaiming that they, at least, had a sense of social purpose, and would retain the rule, themselves, weak-kneed S.M.A.E., or no weak-kneed S.M.A.E.

You get the same sort of thing, too, in club life. There is a general clamour to get something moving for the Juniors. Vast appeals are made to your sense of social purpose; so, at great effort, you lay on a communal building project or perhaps a competition for novices and what happens? The next week you go to a deserted club room and even emptier flying field.

And yes, if you stick your neck out you will be accused of doing so only to stick your head into the sand. In fact, the only way to gain popularity and win friends is to be a thumping reactionary who holds to the belief that anything that doesn't get the approval of Mum and Dad should be banned, and that even the A-frame Pusher over-stepped the bounds of decent restraint.

Club Report

The Little Winching M.A.C. has now been re-formed, and is known as 'The South of England Flyers'. The club has been extended to take in the remnants of a few clubs in the area; secretaries of same will be notified in due course. Club insignia is a boot rampant on a field recessant. Membership fees are collected in the usual way; either by direct threat or begging letter

Glubwurzel Farm is the only available flying site, and flying is restricted to the time it takes Farmer Glubwurzel to get across the lower meadow and load. Members using the site have complained of the stubble, but they are reminded that Sunday morning shaving will remain optional.

Club meetings are held every Thursday at the 'Green Puffin', Wayside Copse, Castle Barbara. Wives and girl friends welcome, but only if sober and licensed to drive. Last week was a 'build a model' night. Each member was issued with two 7 ft. x 6 in. x 6 in. concrete posts, ½ yard washed sand, 4 brass cannonballs and six yards of red flannelette. Winner was A. Tumbril with a model called 'The Storming of the Bastille.' Next week the club will be celebrating the fifth anniversary of the building of a model by a junior member. Members are not asked to bring their wives and girl friends as a special film is to be shown; a club version of the 'The Blue Max'.

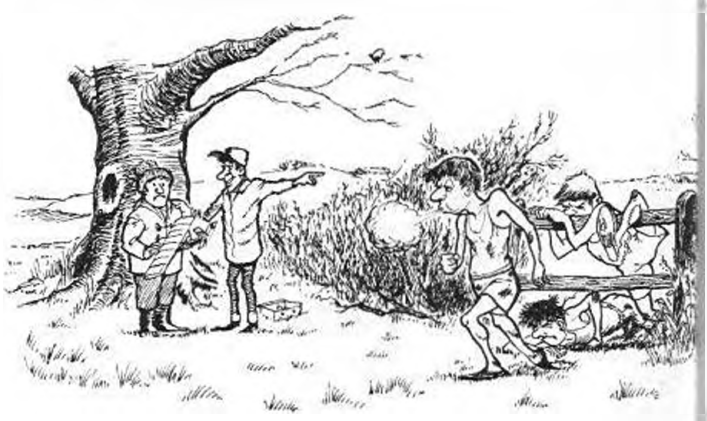
New members are welcome. Choice of Hon. Secretary and Hon. Treasurer available to early applicants.

Body Politic

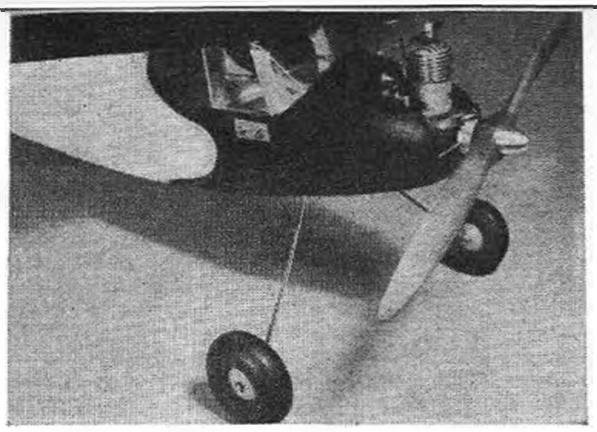
Club Newsletter editors complain of the poverty of hard gen to be found in and around the club-rooms of Britain. Politics, yes, by the yard—and I don't mean the other kind of Left Wing, Right Wing argy bargy, but our own special model brand. In fact, club politics, which usually dominate the life of the club, and often suck it dry, take supreme precedence over such trivia as the building and flying of model planes. In most of the modern swinging, rather than winging, clubs, model aircraft are rarely referred to, and then only as a hook upon which to hang some personal issue. Silencers, for instance, might be a good talking point, and would be the subject of long and heated exchanges and pages of editorial comment in the club mag., although no one in the club had any intention of using a silencer; many even had only the vaguest idea of what the thing was. They could hardly use one anyway, as the club did not possess that subject of another political hot chestnut, a flying field, on which to try it out.

Many clubs get so dramatically involved in the political debates and the clash of personalities that members who have long ago forsaken model flying for bingo turn up regularly each week at the club-room to keep up with the continuing story of prating place. In some of the more politically advanced clubs the members get so bogged down in their parochial affairs that the model world loses sight of them. They are considered defunct and taken over by district scouring club groups. A shock, of course, for the district organiser to find that one of the clubs he has tidied up is still very much kicking, if not exactly alive, with at least a hundred paper members and the claim of being the largest club in the country.

What offers for the S.M.A.E.?



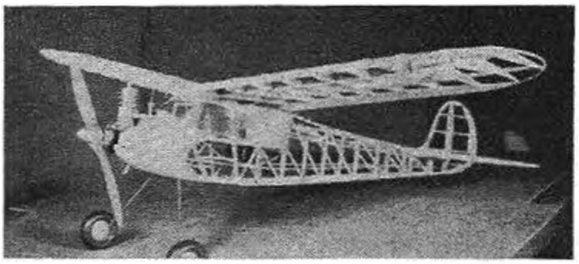
"Olympic Training, Nothing!—That's our Wakefield Team!"



IN ANSWER TO MANY APPEALS FOR AN ATTRACTIVE VINTAGE MODEL WE REVIVE A GREAT FAVOURITE FROM PRE-W.W.2 FROM THE PAGES OF "AIR TRAILS"

Air Trails *SPORTSTER*

A 46in. design for free flight by Ben. E. Shereshaw



TWENTY-NINE years old this month, this design represents a true vintage sports model for 3.5 cc. to answer the innumerable requests we have had for vintage plans. Initially published in the American magazine *Air Trails*, of fond memory, the Sportster introduced a new classification in engine capacity and started a series of attractive cabin power models which were used for competition as well as fun flying through from 1939 to 1944. Who could deny that the lines are attractive? The vertical fin shape, which was to become the trade mark of the many Ben Shereshaw designs subsequently kitted, the stringered fuselage, the large curving transparent cabin area and the robustness of the structure characterised a model of an era which many old timers hold in happy memory.

When it was introduced in *Air Trails* magazine, the Sportster was a small design for power, particularly when one considers that only spark ignition could be used and the model had to carry the payload of a coil, condenser and flight batteries. Ben Shereshaw had created what was then termed a "small bore" engine which was to have been put out as a do-it-yourself magazine design. Named the "Bantam", the engine proved to be so popular and successful that Ben put into production and for many, this new .19 (3.25 cc.) engine created a new engine capacity class and a new phase in model engine design. For the "Bantam", in terms of power to weight ratio was an exceptional product by any standards. It was practically the first rear disc valve induction engine to go into mass production. It was extremely light in weight. It peaked very happily at high r.p.m. on small diameter airscrews and when subsequently employed for the 1945 period pylon model such as the Goldberg *Intercepter*, it was darned near invincible till the arrival of the Ardens and accompanying Glowplugs.

So, in many ways, this model was a trail blazer and we are sure that by using a diesel to take advantage of the short nose and to eliminate the weight of the batteries and coil, the Sportster will provide scintillating performance today.

The plan includes all the detail exactly as the original presented by Ben had in the March 1939 *Air Trails*. This means that installation of battery box, coil, and relevant formers and bulkheads as necessary, are provided for the vintage purists who believe in using nothing but the original material. For those using a diesel or a glow engine, such details can be omitted.

As the designer was a perfectionist, his original instructions for assembly were also more complex than those to which we have become accustomed. For example, he recommended the construction of a jig to hold the longerons and diagonal members in place over the drawn positions on the plan whilst the parts were assembled and the cement was drying. The jig was formed by tacking brads on either side of the components; but nowadays, we have become used to using a soft board, household or steel pins and do not go to the extent of using jigs. Assembly begins with fuselage sides by laying out the longerons and by fitting all the diagonal and vertical cross members as can be seen in the side elevation. The sketch on the plan clearly indicates how the cabin is subsequently made as a sub-assembly and the nose framework extends on the basic sides along the line of the horizontal longerons only. Make two sides exactly the same, one over the other, above the plan. When these are dry, they must be joined by the cross members as indicated in the plan view. Start joining the fuselage sides at the cabin area where the width is constant, fitting former C at the third spacer position and this will be found to keep the assembly square. Draw the nose together and then the tail, fitting the intermediate cross members at each point as indicated in the plan view. Use plenty of elastic bands to draw the longerons in at the nose for the rather sharp curve at F1. Formers A and B should also be fitted to help keep the nose assembly square but first check the slot spacing for your engine bearers, having decided which particular engine you intend to use.

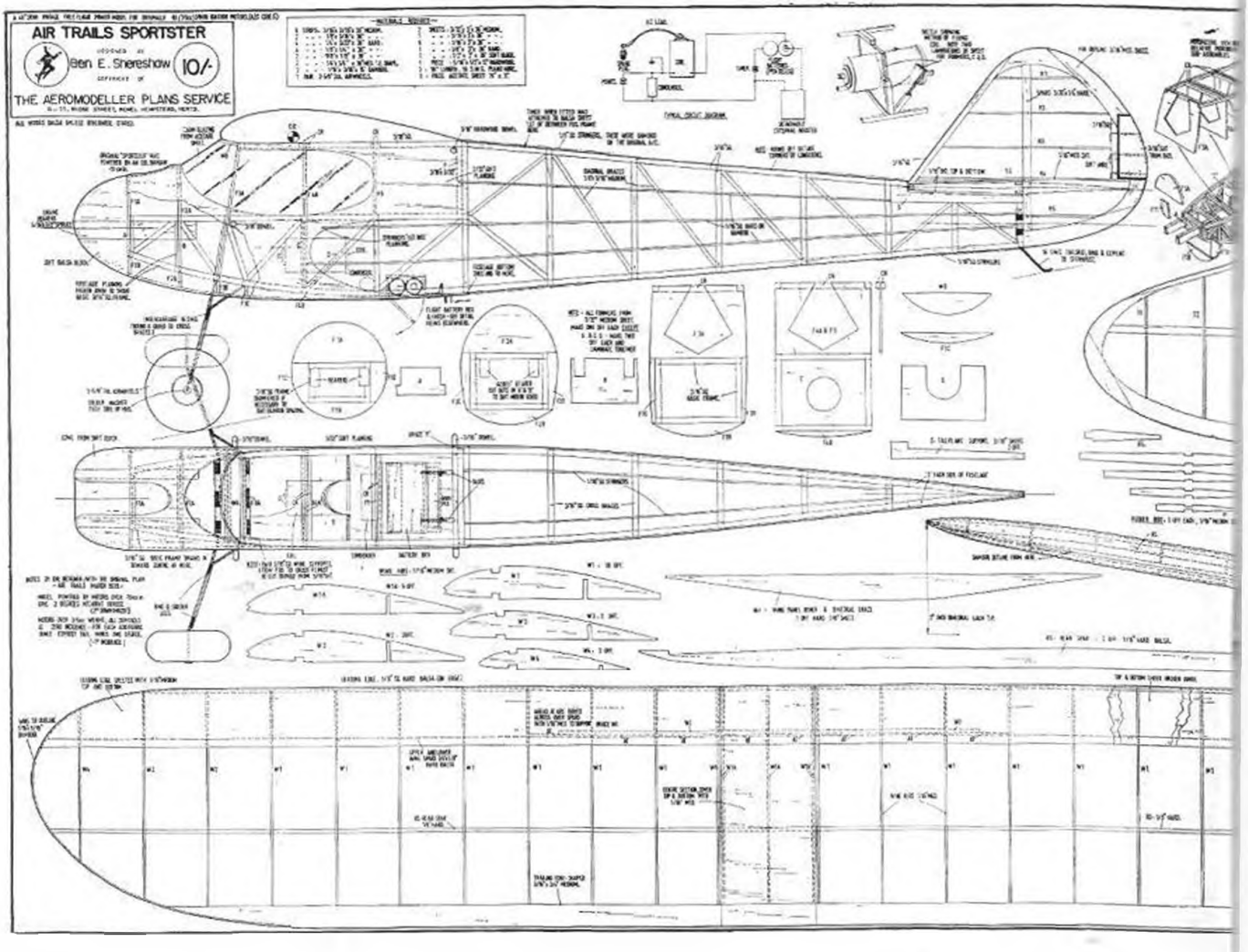
The cabin sub-assembly, using formers F3a, F4a, F5 and the upper false longerons which create the wing seat, are self explanatory on sight of the diagram. This can be made up ready to fit on the nose frame and formers prepared to round off the nose. Before fitting these however, bend the undercarriage, noting that it is from doubled lengths of 16 s.w.g. only and bind securely to the cross members at F3b and F3c positions. It should be noted that air wheels are specified on the plans as used during the 1939 period. These pneumatic wheels absorbed a lot of the landing loads and hence there was little need for

a very rigid heavy gauge undercarriage wire. Those who intend to use solid wheels should increase the wire diameter to 14 s.w.g. When the nose formers are fitted, the cabin is sheeted and nose blocks prepared to provide the shape to suit the engine. A tank can be positioned in the area near F2a and fuel shut-off and modern timer accommodated according to one's modern whims. It should be noted that the original timer which interrupted the circuit for the coil and condenser was positioned above the fuselage, and behind the wing trailing edge. This was a normal position since most flights started by taking off on the undercarriage from the ground.

The tail surfaces should be the next task. The structure is rather like that introduced by the Californian Radio Control enthusiasts in, for example, the "Smog Hog" design by Howard Bonner. The similarity ends when one begins to study the weight of the structure! In each case for the fin or the tailplane, the lower spar is laid down first over the position on the drawing and the ribs cemented in place on the spars. Make sure they maintain proper alignment. The eighth balsa outline is then cemented in place, jigging it up with scrap balsa over the building board in order that it meets the rib centre lines properly. The outline should be roughly precarved to the airfoil contour before making this joint in order not to strain the structure too much after it has been assembled. The upper spar can then be fitted and when thoroughly dry, the assembly lifted from the pian, and in the case of tailplane, the centre section sheeted. It is recommended that the spar on the tailplane could be boxed in with webs on either side for added rigidity, and the builder should also pay attention to the recommendation for the "T" section false spars to support the trim tab hinges. The tail assembly is deliberately kept light particularly in view of the short nose moment. For this reason, one should choose only soft balsa wood for the $\frac{3}{16}$ in. thick trim tabs.

Study the wing structure carefully before tackling this most important part of the model. Note that the centre section is flat, to seat on the cabin superstructure and there is plain dihedral out to the tips. This amounts to three inches under each tip as shown in the front view. The wing panel joiner and dihedral brace as well as the spar pattern are given full size on the drawing for the sake of accuracy. Cut these parts carefully and make sure that the contours are correct.

The wing is constructed in its three sections, the centre section and the two panels. Start by laying down the $\frac{1}{4}$ x $\frac{1}{8}$ in. hard balsa lower spar and the $\frac{1}{8}$ in. hard pattern cut rear spar for whichever panel you have chosen. Cement the ribs for that panel at their proper station. Ensure that the ribs are all properly aligned both fore and aft and also that they are perpendicular to the building board. The root ribs (which are laminated two standard ribs) are cemented at an angle which would result in the



proper dihedral for each panel. Refer to the front view and make a small jig or pattern to ensure that this is correct. The original tips can be made of bamboo such as can be obtained from craft shops dealing with basket work material, but in the event of difficulty in local supply one must laminate the tips from 1/8 in. balsa using four or five laminations to obtain the outline. If bamboo is obtainable it can easily be bent to shape over a gas stove or Bunsen burner. Now attach leading and trailing edges into position. Again making sure of alignment. It might be a good idea to add a few triangular gussets at the junction with the trailing edge in order to preserve a good joint and others might prefer to slot the ribs into the trailing edge, but this must be allowed for when originally preparing the ribs. The upper spar is fitted and for the inner three rib bays, the two main spars are boxed with 1/8 in. medium sheet between ribs W1. This adds considerable strength and is also used as an attachment point for part WJ—the wing panel joiner. The opposite wing panel is then prepared and also the centre section, fitting the centre section end ribs (which are also laminations of two standard ribs) to accommodate the angle and also to match up with the root ribs of the wing panel so that the correct dihedral results. The three panels are then joined together with part WJ. This must be of strong grade balsa and the joint double-cemented for security. Finally, the entire leading edge is sheeted with 1/16 in. medium balsa, sanded before application to about 1/20th so that it is not necessary to rub over afterwards which creates the "starved horse" look of sagging sheet between the ribs. The wing tip area is cleaned up and now we have virtually a complete airframe ready for covering.

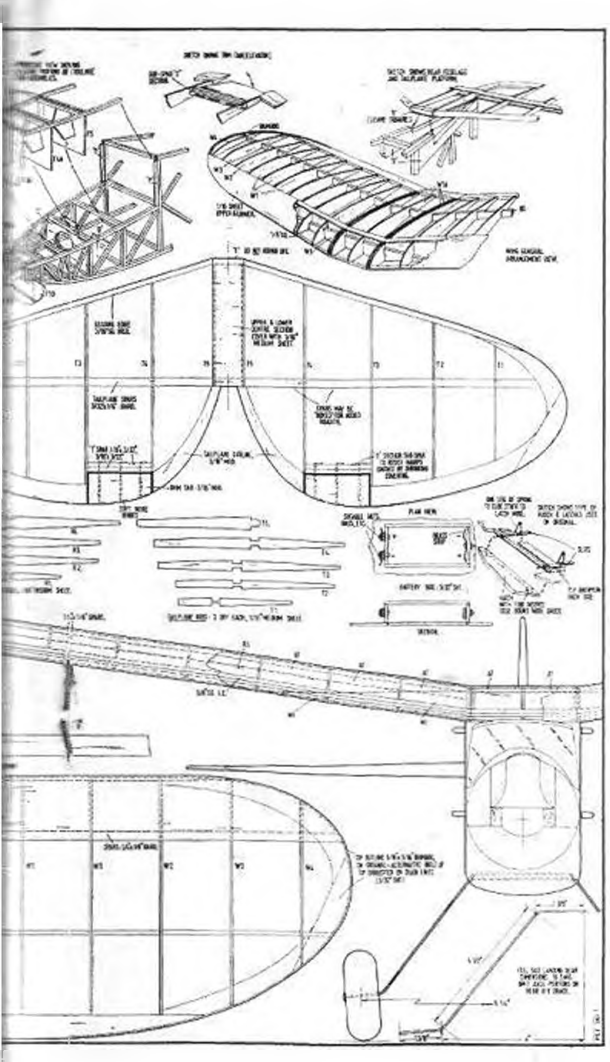
The original aircraft was covered in a light shade of what was then called Bamboo tissue, the nearest equivalent today being wet strengthened Modelspan. Three coats of dope was applied to the colour tissue of the original.

No records have been retained of the weight of the original model but the reader may take it from us that it was *light* by modern standards. Obviously the performance of such a model will be improved by weight saving and careful construction throughout, in fact the Sportster represents a very interesting structural assembly challenge for the modern modeller.

The provision of trim tabs on the tail surfaces and Ben's rule of thumb recommendation for correcting the tail angle according to the weight of the engine (motors over 3½ ounces should demand minus 1 deg. incidence for each additional ounce), make for a very easily trimmed design.

We know from letter requests how many modellers will appreciate this renovation of a good looking model. It comes from an era when the Douglas D.C.5 was news, when the Brown junior engine was still on sale (at $10 each), the Ohlsson 23 had just been introduced at $16:50 and the latest airliner was the Boeing Stratoliner. The Paris Air Show was showing the latest version of the then new Hawker Hurricane and the Fokker D.XXIII twin-engined twin boom fighter was the sensation of the month. Megows of Chicago had introduced Planefilm, "The Magic Covering" which was a forerunner of today's MonoKote. And . . . dare we mention it? for each $1:50 subscription for a year's supply to Air Trails magazine a modeller was offered a FREE kit of Jim Cahill's Wakefield winner!

Times certainly have changed! By building the *A. T. Sportster*, modellers can turn the clock back and appreciate something of the skills of earlier designers and also obtain an enormous amount of pleasure in the process. Today Ben Shereshaw is still connected with this hobby. He has over the past few years, been perfecting his twin cylinder R/C motor, the latest twin carburettor version was displayed appropriately enough among the old timer designs in the vast hangar of Los Alomitos, California, during the 1967 American National Championships. We are indebted to Ben for his permission to reproduce the design and wish him many many more years of modelling satisfaction.



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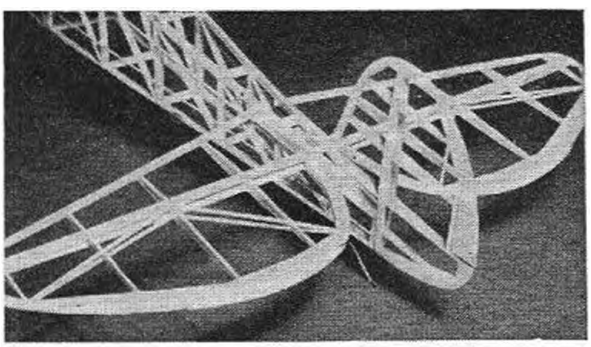
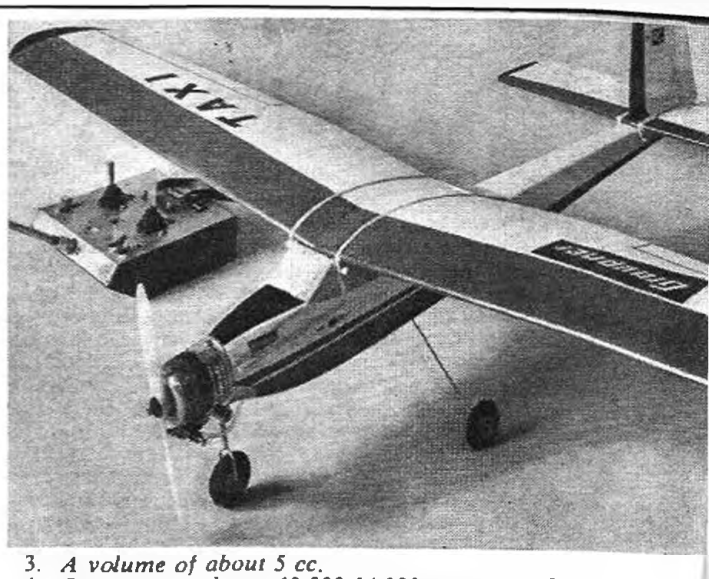


Tailpiece at right displays the lightweight structure of the Sportster—featuring a spar system that was to become widely adopted 20 years after for R/C models.

FIRST MODEL-SIZE WANKEL ENGINE IS DEVELOPED FOR PRODUCTION BY GRAUPNER

Wankel rotary piston engines



Right: the Taxi ready for flight with 6/67 type engine.

IN 1960 the first details of the Wankel engine became generally known. An explanation of the basic principles of the engine, which have been taken for granted in this article, were described in the Aeromodeller Annual for 1964/5.

The rotary piston engine, as it is officially known, will have several advantages over the conventional two-stroke engine, *e.g.*:

1. Neater shape, taking up less room, and particularly suitable for fitting in aircraft, blending well with the fuselage.

2. Smoother running because the unit has a rotary motion, thus vibrations can be completely absorbed by the mounting, whereas the oscillating movement of a normal engine vibrates the whole unit, giving rise to vibrations that cannot be entirely damped out.

The neat shape offers model builders visual advantages, for in most cases the projecting cylinder head spoils the contours of the fuselage nose.

The vibration-free running of the motor is particularly important. With present-day mechanically actuated radio control servos, the greatest enemy is unwanted vibration, and the value of such a smooth-running engine cannot be too highly stressed.

It was this train of thought that led Graupner to seek early contact with the developers of the Wankel engine.

10th March, 1961

This was the date of the first meeting. Fred Militky, representing Graupner, visited the technical development department of the Frauenhofer company and asked whether it would be practicable to develop a small rotary engine for model aircraft.

Herr Schagg of the Frauenhofer showed great interest and promised to work on the problem in his spare time. During these first discussions the following basic principles were laid down.

1. *Air-cooled*
2. *Have glowplug ignition like normal engines*
3. *A volume of about 5 cc.*
4. *Operate at about 12,000-14,000 r.p.m. with a 10 x 4 in. propeller*
5. *Run on the usual fuels for glowplug engines*

It was also decided that the model engine should have the same basic form as the production NSU-Wankel engine, *i.e.* a 2-loop (figure-of-eight) trochoid*, with a triangular rotor—this being the only arrangement that makes possible a four-stroke cycle without extra components.

A further very important stipulation for any prototype was that all the construction work for a later series production should be taken into consideration from the start. In fact, it would probably have been easier and might have led to quicker practical results had the engine been built *without* this consideration; however, the chosen course, although more difficult at the outset, ultimately made the later production easier.

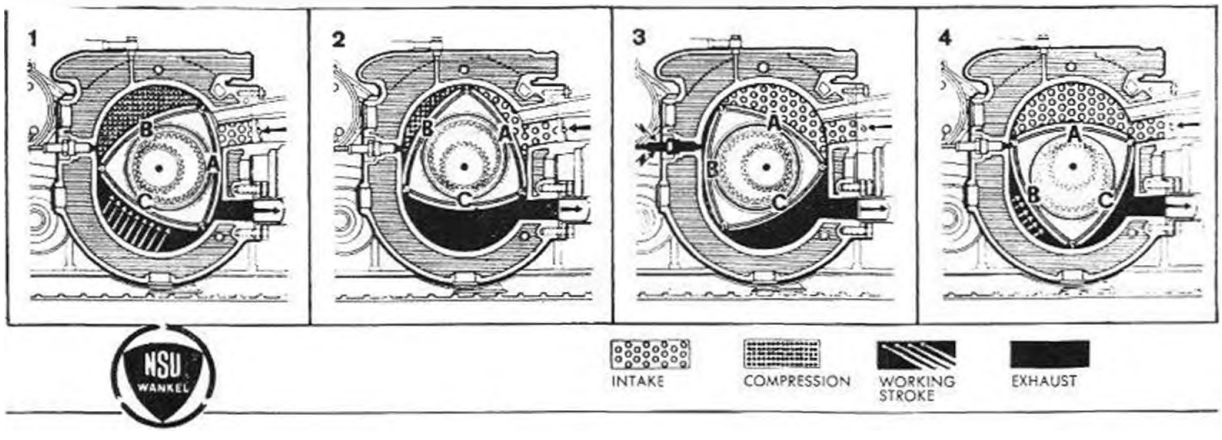
In the weeks that followed, Herr Schagg worked out the theoretical basis for the design of a model engine on the Wankel principle. Next to the constructional problems, such as fitting the proper bearings, the gearing, cooling and sealing, it was mainly a question of overcoming the technical difficulties—greatest of which was to decide the choice of material.

The main criterion for the efficient working of the engine was the production of a geometrically exact trochoid with sufficiently good running surfaces.

As there were a large number of problems which could not be resolved on the basis of experience gained in the construction of two-stroke engines, the

* *Trochoid*: A curve traced by a point on or connected with a rolling circle.

Official NSU diagrams for their "Spider" car engine shows the four cycles of operation, with watercooling jacket in this case.



first practical trials were rather protracted and unsatisfactory. The torque necessary to start the engine was too high. This first engine was driven externally by an electric drill so that the ignition and combustion could be studied.

The results of each test were systematically analysed and the testing progressed step by step.

At the end of 1964, things had reached the stage where an engine fitted with a propeller would run by itself after it had been started with an electric drill.

Technical Data for Type 12/64

Volume	:	3.6 cc.
Propeller	:	9 x 4 in., reduced to 8¼ x 4 in.
Fuel	:	Cox Blue for glowplug engines
Glowplug	:	O.S. No. 5
R.P.M.	:	11,000 max.
Overall diameter	:	2½ in.

First flight

30th September, 1966, was a memorable day; the Graupner team flew a model aeroplane fitted with a Wankel engine. The capability of the Wankel engine is shown by the fact that it was used to power the big *Caravelle*.

The type 9/66 engine already had all the features of the later production models, with the exception of the throttle mechanism.

Technical Data for Type 9/66

Propeller	:	11 x 4 in.
Fuel	:	Graupner Titan G
Model	:	Graupner Caravelle
Wingspan	:	71 in.
R/C Unit	:	Grundig Variophon 6-Channel
Weight	:	6 lb. 15 oz.

The remarkable results of the first test flights, during which many flights of about 15 minutes duration were achieved, added impetus to the work.

By 8th December, 1966, an engine had been tested which, fitted with a 10 x 4 in. propeller, had reached 10,500 r.p.m. and had the required endurance.

Further tests were made on the throttle mechanism. Acceptable results had been achieved using the standard carburettor of an O.S. engine. Naturally, attempts were made to improve on this with special designs.

A Graupner *Taxi* was chosen for these further tests. The fuselage was adapted to accommodate the round engine. A Grundig Digital R/C unit was used.

Taxi with the Wankel Engine
Technical Data

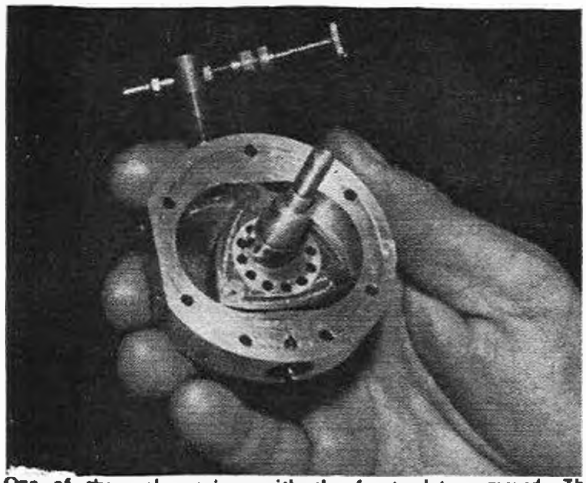
Wingspan	:	60 in.
Fuselage length	:	40 in.
Wing Area	:	493 sq. in.
Total Area	:	622 sq. in.
Tailplane	:	129 sq. in.
Weight	:	4 lbs. 9 oz.
R/C Unit		Grundig Digital TX/RX 14

Wankel Type 5/67 Engine

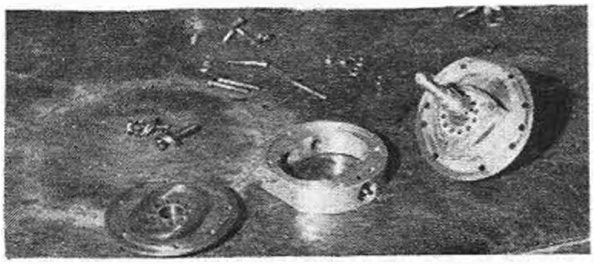
Volume	:	4.2 cc.
Weight with propeller	:	13 oz
R.P.M.	:	12,000 (propeller 10 x 4 in.)
Output	:	0.4 h.p.
Fuel	:	Graupner Titan G
Glowplug	:	OK
Cooling	:	Air
Starter	:	12V or Taifun Quickstarter
Throttle-Carburettor	:	OS Max 40
Diameter	:	2 9/16 in.
Length (without crankshaft)	:	2 3/16 in.

The first attempts were successful. The engine output gave the model very good flying characteristics. Long steep climbs showed that the engine had a favourable output ratio.

One of the developments of type 5/67—the type



One of the early engines with the front plate removed. The triangular rotor and figure-of-eight shaped trochoid can be clearly seen, also evident in view below of the motor stripped down.



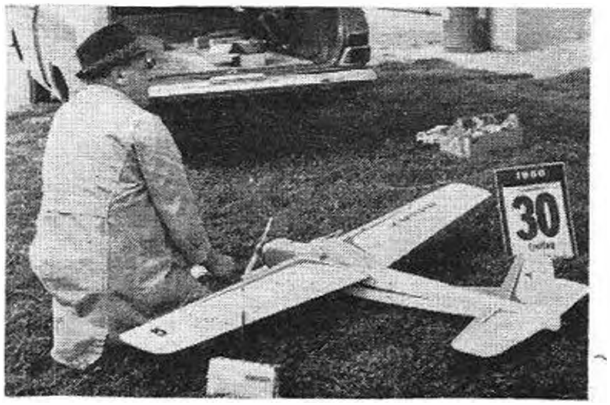
6/67 showed further improvements. Comparative figures are given below:

Wankel Engine with built-in Carburettor

	Type 5/67	Type 6/67
Volume	4.2 cc. (.25 cu .in.)	4.2 cc. (.25 cu. in.)
Weight	13 oz.	14 oz.
R.P.M.	12,000 (10 x 4 in.)	13,200 (10 x 4 in.)
		12,000 (11 x 5½ in.)
Power	0.4 h.p.	0.5 h.p.
Fuel	Graupner Titan G plus	
Glowplug	OK	
Cooling	Air	
For comparison	OS Max 19, 3.2 cc.	
	11,000 r.p.m. with 10 x 4 in. prop.	

The successful results decided Graupner to exhibit the engine by demonstrating the *Taxi* model fitted

The great day! 30th September, 1966, and Herr Johannes Graupner ready to fly his Caravelle with engine 9/66.



with a Wankel engine during the R/C World Championships in Corsica from 21st to 27th June, 1967. *(Page 528, October 1967 issue.)*

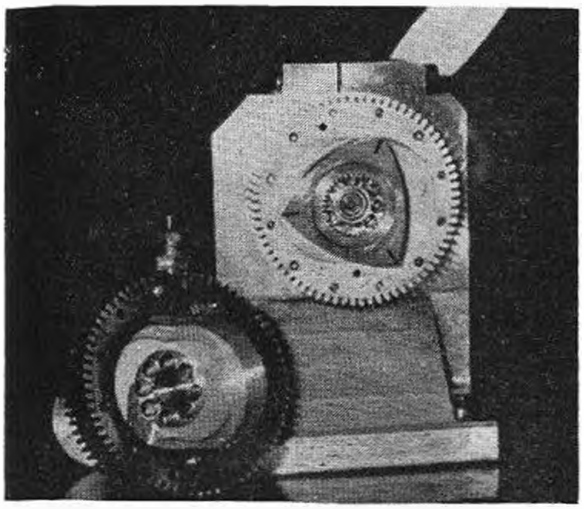
The demonstration was a great technical surprise at the championships, and the engine attracted great attention. In particular, its smooth running, sure starting and ability to draw fuel in any position were greatly appreciated, as was the favourable shape which made possible an almost perfect mounting in the fuselage.

Weight

In the foregoing report, all the details are given as they turned out during development. This is why the weights given are, for example, so high. It must be borne in mind that the prototype engines were worked from solid material. The castings which would be used in mass production were not available, and these, were material carefully chosen. would reduce the weight considerably.

The Future

During the last six years of development, many



different engines have been designed and tested. Technically speaking, a most satisfactory stage has now been reached—as anyone who has followed the progress will agree. Further development is contemplated and work will begin soon.

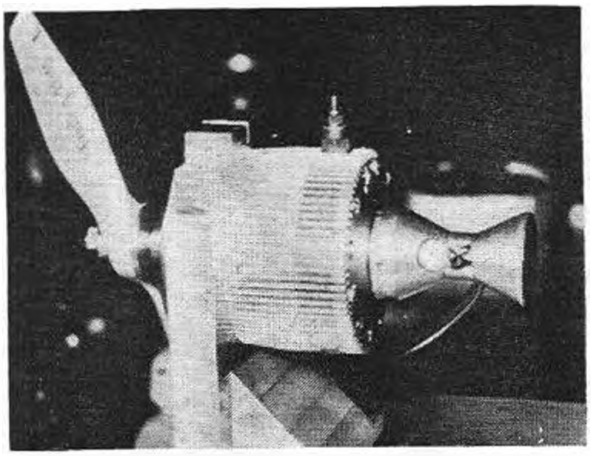
Series production of the Wankel engine will be undertaken as soon as development has been completed. The date for introducing the series cannot yet be fixed and an announcement will be made in due course.

The principle of the rotary piston engine is protected by a "ring" of patents. The rights to the basic principle are held by NSU-Wankel.

Graupner hold a licence for producing model engines operating on the rotary piston principle.

Basic Operating Principles

The Wankel engine is a rotary piston engine. The first engine built by F. Wankel was a true rotary engine, i.e., the 2-loop trochoidal combustion chamber and the triangular rotor rotated about their centres on a fixed shaft. This method of construction is rather complicated due to the necessity to fit ignition, cooling, fuel injection and exhaust arrangements in the rotating parts. The present engine, known as the rotary piston engine, is—kinetically speaking—the reverse of the foregoing. Here the trochoid becomes



Engine ready for running with a wooden propeller. In its shape, this type was approaching the ideal. Numerous cooling fins were made on the casing, the carburettor fitted in the rear of the engine did not conform to normal construction. The engine ran anti-clockwise. Below left shows the interior of the 12/64 engine.

a fixed housing, while the triangular rotor follows a planetary path. It turns about its axis and moves around the eccentric curve. Thus, the rotor, provided with thick strips on its angles, describes a perfect trochoid, enclosing a volume which varies sinusoidally as it rotates. By means of a hollow gear ring on the piston, and a fixed pinion on the side-plate fitted to the trochoid, the path of the rotor is transformed into an eccentric curve and the three corners forced to describe a trochoid. The rotor itself is torque-free, for the resultant of the force of the gas always passes through a mid-point of the eccentric and transmits the torque to the crankshaft. The gears, in a 2:3 ratio, have only a guiding function and take up only the acceleration stresses. The resulting forces can be completely absorbed by the bearing so that no free momentum occurs. The rotary piston engine works naturally without extra parts to a four-stroke cycle, and in each revolution performs a complete cycle. It also has the same ignition sequence as a two-stroke engine, so that it is possible to make a direct comparison between a two-stroke and a Wankel engine. In fact, the driving stroke of a Wankel engine is better, because is covers 270°, whereas in a two-stroke engine a power stroke covering 140-150° is the best available—even in the most favourable instances.

The Wankel engine-mounting in the Caravelle fuselage. No cowling was used. The possibilities for fitting it neatly in special model can be clearly seen.

MAGNET STEERED SLOPE SOARING

PART 1 By Trevor Faulkner

THE RECENT widespread use of radio control for model slope-soaring gliders has forged ahead so rapidly that it becomes necessary to question the validity of employing any other means of control.

To provide an answer to this query, we must review first of all, any possible shortcomings of the R/C system, and any virtues of an alternative. In passing, it should be remembered that continental interest in magnet-steering is considerable: *many* British fliers have never seen an example of the class, and are therefore at a loss to evaluate its claims for their consideration.

Had this article been written 4 years ago, one of the chief arguments would have been that the magnet model was a better rough-weather flyer than the average R/C soarer. Lately, this situation has changed; the modern multi-channel sailplane is capable of coping with extremes of wind-speed, whilst S/C designs have improved so that a good Model/modeller combination makes round-the-year flying from soaring sites quite a feasible proposition. However, improvements in design, equipment and technique have brought problems in the wake of their advance as, for example, in the following four categories.

I. *Air Saturation*—Despite the increasing use of superhet equipment, modellers may still find themselves missing hours of pleasurable flying by having to await their turn. (The slope-soaring competition, with its impounded Tx sets epitomises this).

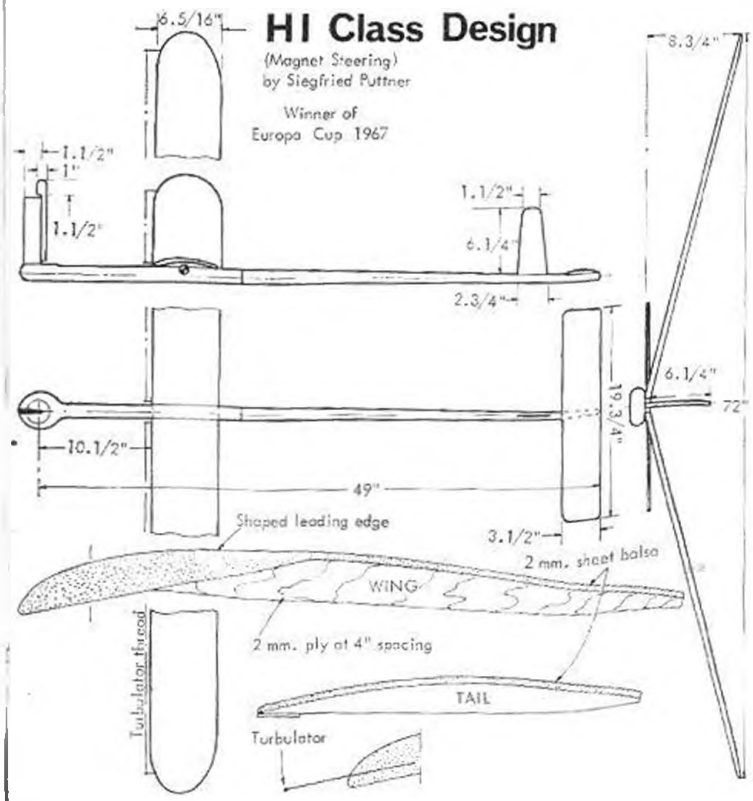
The S/C super-regen adherent is particularly vulnerable; he is often at the beginning of his association with radio flying, and bursting with initial enthusiasm.—*What a waste of time in his case!*

II. *Overall Cost:* I know that much has been written about the influence of the young, but apart from those who can demonstrate their enviable circumstances, a vast number remain who need to consider shillings rather than pounds. Again, the younger married man returning to the hobby, may find the demands of a new home and young family exerting a modifying influence on exactly what he can afford to fly.

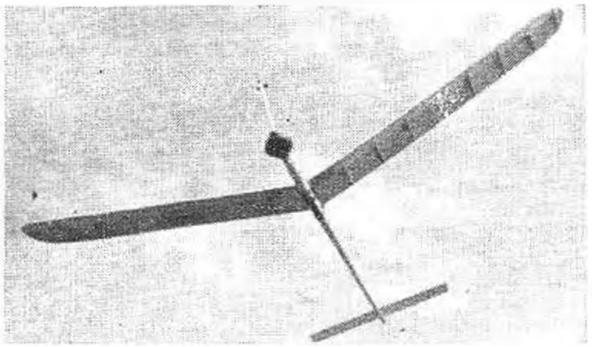
The cost of repairs and replacements will vary according to the type of flying being pursued, individual skill, luck and specialist knowledge. R/C can make heavy demands in terms of cash on those not well-versed in its complexities, much more so than other facets of the hobby.

Responsibility for deciding what one can really afford obviously must remain the province of the individual, but he should, in his own interests, make sure of the course upon which he is bound to embark.

III. *Ignorance of Radio:* A few people exist who, although wishing to exert a degree of control over a model soarer, are reluctant to employ R/C because they cannot master the basic elements or principles of radio theory and practice.



Heading shows a typical Continental slope with 3 Magnet models soaring. At left and below, Herr Puttner's simple but successful design.



To them, a fault becomes a threat, rather than a pleasant puzzle to be solved—not a very sound basis for what is, after all, a pastime.

IV. *Love of Free-Flight:* This most important factor deters many competent modellers from embarking on R/C. They know, from experience, the quality of flying which comes from a well-designed, inherently stable, high performance machine. That touch of the "Thoroughbred", is seldom achieved so often by other classes of model, and is difficult to abandon when once it has been sampled. True, these adherents tend to fly A/1 or A/2 models in soaring events, sometimes making quite spectacular flights when conditions are right (*i.e.* low wind-speed, high level of thermal activity, low turbulence at near-ground levels). Actually, the hill or slope is regarded as a massive towline, so that the height it offers is more important than the airflow over its surface.

Competitions for these models revert to pre-war and immediate post-war patterns—the adding together of a limited number of "Unlimited" flight times being considered sufficient to differentiate the winners from the rest of the contestants. (An odd example of grafting an old branch onto a young tree).

Magnet-Steering Competition

The magnet-model is flown (in continental competitions) to a set number of "Maxes", usually 5 by 5 mins. In recent years, the *Coppa Europa* has only once been decided by fly-off, but a limited flight-time has kept model losses low.

One can, therefore, see that a most interesting kind of event could be promoted in this country, involving the modeller in maximum participant activity, and making it less disastrous to 'drop' a max in terms of ultimate success.

Conditions in England are, according to Hans Gremmer (the originator of magnet-steering), much more severe than on most continental slopes. It is therefore logical to *reduce* max. times. This, in turn, will aid recovery of badly trimmed models, and allow more flights per competition—for example—10 by 3 minutes or even 10 by 2 mins. In a recent discussion, Herr Gremmer agreed that such a form of competition appeared sound and attractive, *and* could provide more spectator appeal than free flight can hope to achieve.

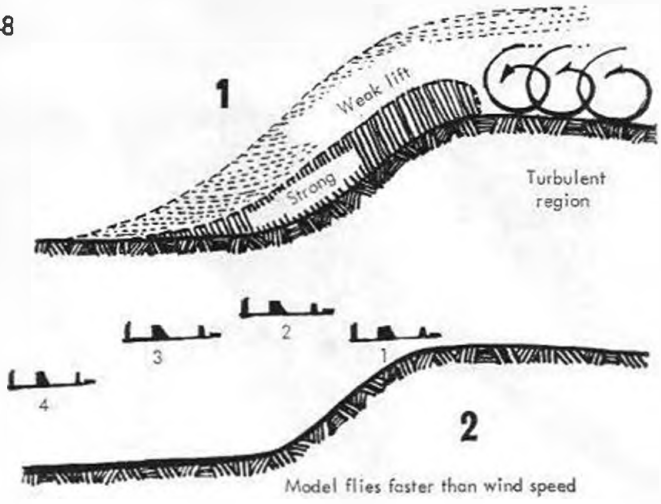
Resistance to Damage

As a magnet-soarer, when trimmed adequately, will almost always land facing into wind, its usual impact speed is very low. When correctly designed and constructed, its useful life is exceptional. To this may be added the low O.O.S. rate of losing models, and it will be understood why this class is attractive to modellers with limited building or repairing time available to them.

To summarise, the magnet class can offer the following attractions:

(1) "No waiting" for Flying and Trimming Sessions.
(2) Small Capital Investment.
(3) Simple, Easy to Understand, Control System.
(4) The virtues of Free-Flight Models without Attendant Recovery Problems and a new Slant on Competition.
(5) Durable Models: Less Time on Building and Repairs.

The magnet-soarer is designed for one task only,—to fly within the lift area of a given slope. Failure to stay in this air-space means a loss of height and an earlier end to the flight than planned. (See diagrams 2 and 3). As wind conditions change, the model must be capable of being trimmed to a variety of flying speeds without loss of efficiency, *or* it must produce a flight pattern designed to keep it within the lift-zone.



Flight Patterns

If the airspeed of the model can be matched exactly to that of the wind, the resultant ground speed will be zero; increasing the flying speed allows flight *away* from the slope, whilst lowering the speed will result in disappearance *behind* the point of launch, into the turbulent region (Diagrams 1 and 3).

The above requirements may be fulfilled by a predictable or directionally constant flier, and to this end, the north-seeking force of the magnet must be sufficient to produce corrections during flight.

As the energy from this source is necessarily limited, the model must be sufficiently sensitive to respond adequately. Various ways of adjusting flying-speed are practised, for instance, the addition of ballast, movement of the centre of gravity (with corresponding adjustment of tail-plane incidence), or changes of stabiliser section, again with incidence adjustment.

Altering the flight pattern can be done by interrupting magnet response entirely, partially, or intermittantly.

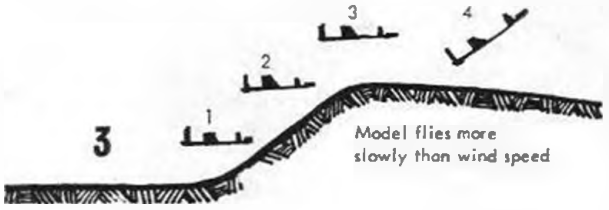
In practical terms, this means that a strong magnet bar operating an aerodynamically efficient fin/rudder system, and mounted in a correctly designed and accurately built model will be capable of staying in a slope lift zone when properly trimmed. It will be characterized in flight by its rapid response to turbulence and its "groovy" turns without undue height loss when flying a curved path. Sideslips and yawing are possible flight features which can help under certain conditions, but usually they are detrimental to performance.

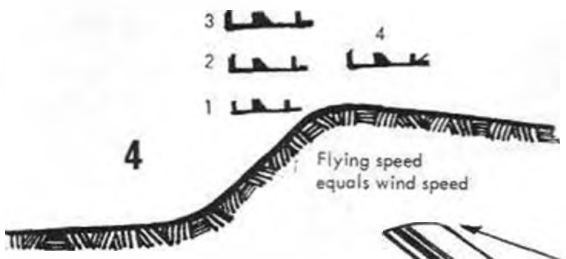
English conditions usually demand that a model can be trimmed to fly in medium to strong winds, rather than a model fitted to high performance in the low-wind-speed range and the ability to fly complex patterns.

Diagram 5 shows two typical layouts: contrary to normal A/2 practice, the *longer* model is for rough weather. This nose moment arm gives a much more decisive correcting force, and needs a long tail moment to achieve satisfactory pitch-damping and disposition of side areas.

The short-nose layout, by contrast, responds more slowly to corrections and can have an attractive meandering flight, correcting first-left and then right of a mean flight path, sometimes beating back and forth along a slope whilst the alternating rudder corrections take effect. In these conditions, a longer moment-arm design, set to fly at the *same* airspeed, would have flown through the lift zone because of the more direct flight path.

Aerofoil choice, is, in practice, fairly wide: a high L/D ratio is, of course, important, but equally important is the latitude of good performance over the range of angles



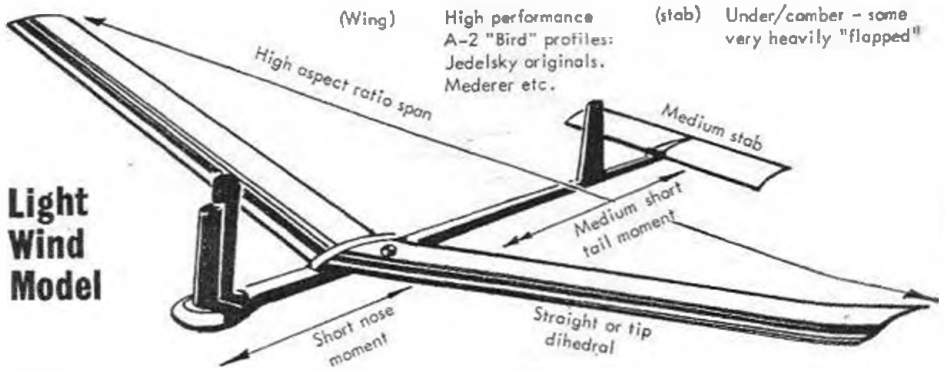


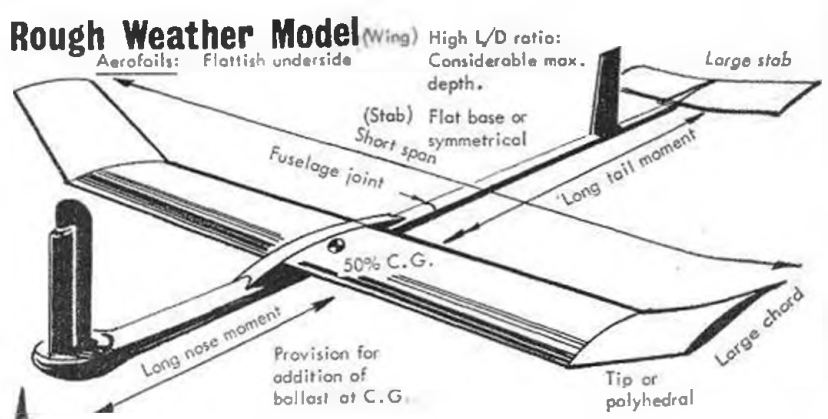
Before passing on to the construction of a proven design of steering unit, it is necessary to outline the function of the magnet-bar itself. This will assist readers not having read articles in the *Aeromodeller* in April, 1955 and December, 1965 to understand the following notes. (It may also correct some misinterpretations of the "magnet" functions amongst modellers who *have* seen these articles).

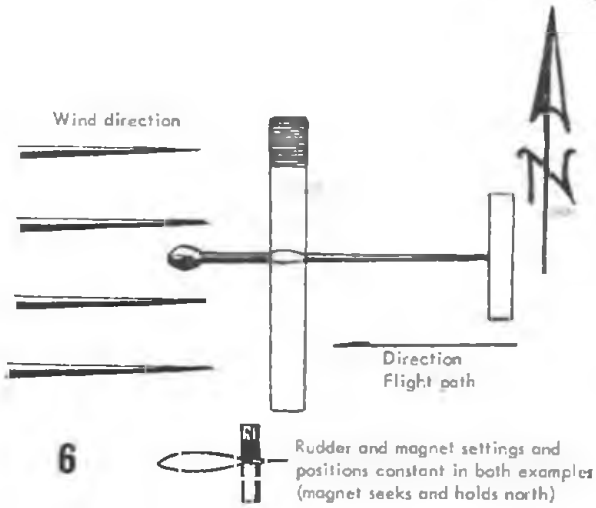
(a) The magnet will attempt to align itself in a N-S direction.
(b) It will exert the maximum force when lying E-W.
(c) The magnet *cannot* detect wind-direction (*i.e.* it cannot detect a wind-shift which may affect the model). (See diagram 7).

So that the characteristic (a) may be used for our purposes, the magnet is linked to a rudder blade in such a way that, although the angle between bar and blade may be adjusted on the ground by modeller, in flight the relationship between the two will remain constant. (Diagram 6).

of attack likely to be met in "tuning". The Eppler sections (computer designed, as now seems fashionable!) include a variety of aerofoils with low profile drag over such a range. These sections are fine if you build accurately; but their characteristics can easily be lost by increased or decreased camber due to construction methods, tissue sag, or simply poor template marking, and making: they then become just as good as a similar "Zip-Zip" section, *and no more*. If you like spars, ribs and the usual impedimenta of wing building, a wing section of adequate strength towards the T.E. is definitely advisable. The NACA 6409 is very good in this respect, and is a "forgiving" type of aerofoil. The Jedelsky A/2 section, now so popular, is also a good choice if you enjoy carving timber or wish to send abroad for machined parts. Its virtues are considerable. Speedy construction; freedom from tissue repairs; warp-free and strong. It would be my choice if I had to confine myself to one wing section only.

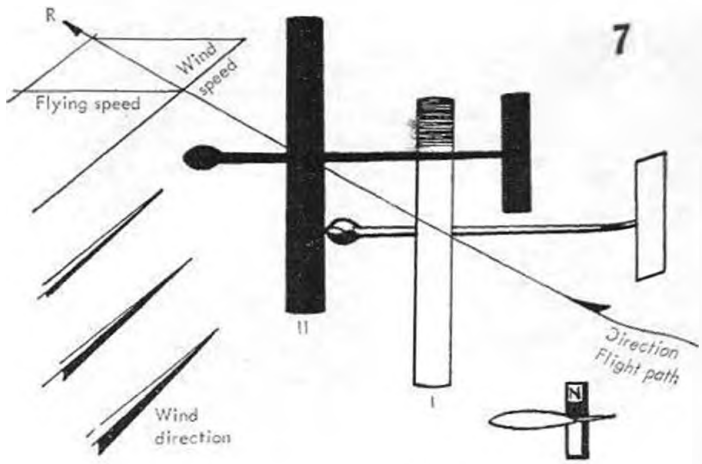


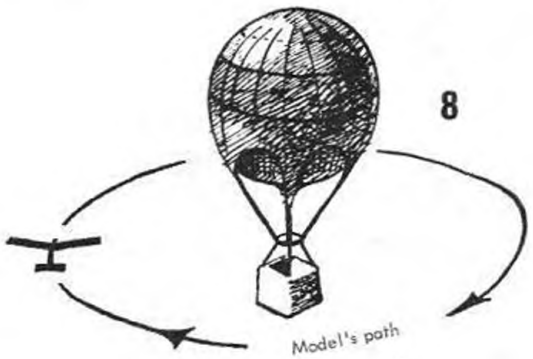




In this manner, it is possible to direct the model to seek a position at pre-determined angle to Magnetic North when it is airborne. (Remember, this angle should be constant for "straight" flight, the model pointing steadily in a fixed direction. The responsibility for making the model point *into wind* is the modellers':—*i.e.* the bearing from Magnetic North should differ from the bearing of the prevailing wind by as nearly 180° as possible.)

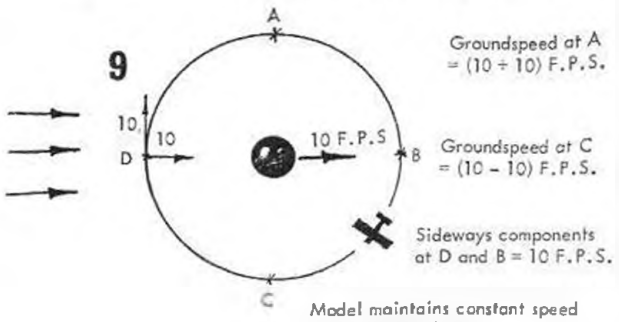
Now, if, as we noted in (c) above, the *flight path* can be affected by a wind change, what advantage can the magnet model boast over that of the fixed forward fin type soarer? (Or, alternatively, why is this type seen to be ineffective in continental competitions for soaring models?).

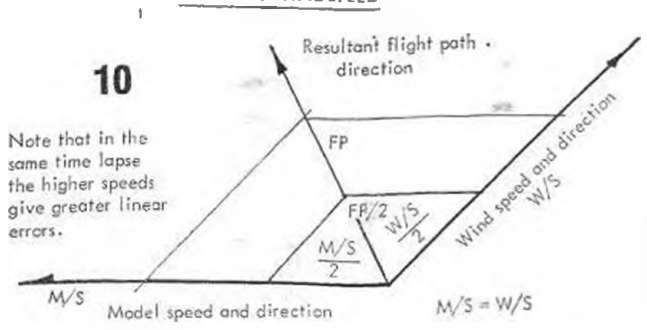




Air speed = 10 F.P.S.

Groundspeed = 10 F.P.S at any point





We must understand that no matter how well-built *any* model aircraft may be, its structure always has defects. These may be caused by poor design, poor workmanship, varying densities in natural and inorganic materials, etc., but the result is always the same—*no model is completely symmetrical about its longitudinal axis.*

Differential reactions to light, temperature and moisture during the course of a day's flying (or even, in extremes, the course of a flight) will produce a flight path which diverges (no matter how slightly), from a straight line. Ultimately, this divergence continues, and we find that the model may be described as attempting to fly in an enormous circle. Why does the forward fin not correct this? The answer is simply—it doesn't know! (or, to be more precise, it has no means of "telling" which way the wind is blowing). Airspeed (with a fixed trim) is constant: the particles of air pass over its surfaces at the same speed irrespective of an observer's casual impression of the machine's behaviour from his position on the ground. (Apparent "slowing up" into wind and "acceleration" down wind are variations in its speed *over the ground* not through the air).

This is simply illustrated by reference to a hypothetical situation. A model glider is circling the basket of a man-carrying balloon: wind speed is nil, and the model remains a fixed distance (radius) from the basket (see diagram 8). Then the wind rises—what is the relative behaviour of the balloon and the model? (Refer to diagram 9). In fact, the model is flying in its own "piece of air": this volume of air is part of a larger flow over the earth when the wind rises.

Applying this to our forward fin model, it becomes clear that as the airflow over this *fixed* component is constant, there is no agency capable of making the model react to the direction of airflow *over the ground.*

The magnet has a constant source of reference to the ground—its magnet's detection of its own position relative to Magnetic North.

The small force exerted by the magnet seeking to align itself North-South is sufficient to ensure maintenance of a fixed bearing, and to avoid the effects of minor structural assymetry, gust disturbances and the like.

Into Wind Flight

The most commonly sought flight path (over the ground) is that which takes the model directly into the prevailing wind.

When *wind speeds* are high, errors become more pronounced, assuming the model to be trimmed to fly at exactly the speed of the wind measured in relation to the ground (10).

Particular attention must therefore be given to the skill of setting the angle between magnet-bar and rudder with as little error as possible. All methods rely on the following.

(1) Accurate plotting of Magnetic North, and the arrangement of some visual means of indicating the direction in which it lies.

(2) Accurate plotting of the prevailing wind direction, and alignment of the fuselage in this direction.

To use (1) and (2), the bar magnet is adjusted to lie N/S whilst the rudder points directly up the centre-line of the fuselage when the components are assembled.

The writer aligns the edge of his model box with the Magnetic bearing of 0°, and finds the wind direction by means of observing a woollen streamer, a flag, pennant or windsock, or even the direction shown by a handful of grass thrown into the air. The fuselage is then aimed in this direction and reference need only be made to the included angle between the rudder blade and the magnet.

A check with the complete assembly can now be carried out. Swing the nose to right of centre: the T.E. of the rudder-blade should move right: swing left causes an opposite reaction from the rudder, (*i.e.* movement left).

The "Cannister" unit

When I wrote, in December, 1965, to explain some of the aspects of flying magnet-steered soarers, the article was confined to a very simple unit in which the fin was tongue-mounted to the fuselage and the lower bearing fixed to the fuselage.

During the past 2 years, I have had more experience with this type and also the more widespread (on the Continent, at least) cannister unit. This latter arrangement, contrary to my initial fears, offers many advantages: it is easier to construct accurately, has improved accessibility, can be cleaned more easily. "Knocks-Off" from any angle of blow, and can be adjusted for circular flight quite simply.

See diagram 11 for details. Note that the alloy base must be flat and the wall height uniform. The base profile is best cut by fine saw rather than by shears: support the metal on hardboard scrap, cutting both together. A fret saw or coping saw will be capable of the work if you don't possess a piercing saw. Drill the base *exactly* in the centre for bearing.

Join the wall with a long scarfe joint or a version of the seam joint shown. Use an epoxy resin here, and to join wall and base: roughen the joint areas before applying the resin, heat-curing as recommended by the adhesive manufacturers. (Use some domestic appliance for this process: the important thing is that the resin should become fluid with heat, and flow into the interstices of the joint).

Mark, cut out and assemble part (A) and (B): do not remove the sector (or rudder clearance or drill holes (1) and (2) until the glue sets. Forward fin design has been the subject of much experiment and development. There is general agreement that a turbulating L.E. allied to a close fit between T.E. and rudder assist in making the unit efficient. (It is quite a revelation to realise that the torque of a short bar magnet, seeking north, can be used to direct a 6ft or 7ft span model weighing, perhaps, up to 2 lbs.).

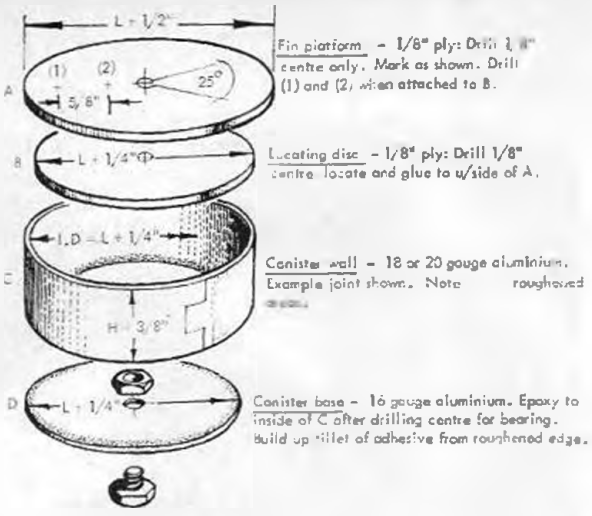
The accompanying design can be employed with confidence and made in either of the 2 ways here described. When the fin is dowelled and glued to the platform, it is most important to ensure its absolute perpendicularity: care at this stage will allow you to use small fin/rudder clearances, thus increasing efficiency.

Fin Construction

First Method (Diagram 12)—Look at the diagrams carefully, and note that the alloy tubes fit into a rebate formed by adjoining 45° chamfers on the two fin halves. Mix enough resin for the process, and warm it slightly before use. Excess resin will be filed off quite easily when set: avoid damage to the fin when filing the tubes by cushioning the fin between balsa "clams" in the vice. File slowly along the length of the tube with a medium or smooth file to avoid distortion. Finish by removing all burrs from the resulting edges.

Second Method (Diagram 13)—Here, tubes are used as templates for both L.E. and T.E. to avoid the rather difficult task of carving these small parts. The fin is designed to have a polyester resin "casting" in both areas. The diagrams explain the procedure, remember to wax the tubes lightly to assist their removal.

In both methods, the top bearing is epoxied in place after a trial assembly. *To be continued*



Fin platform – 1/8" ply: Drill 1/8" centre only. Mark as shown. Drill (1) and (2) when attached to B.

Locating disc – 1/8" ply: Drill 1/8" centre. Locate and glue to u/side of A.

Canister wall – 18 or 20 gauge aluminium. Example joint shown. Note roughened ends.

Canister base – 16 gauge aluminium. Epoxy to inside of C after drilling centre for bearing. Build up fillet of adhesive from roughened edge.

Unit for Graupner type Assembly

H = distance from face of bearing screw to top of cog, soldered to ring (Cog from old clock)

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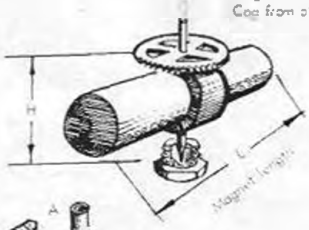

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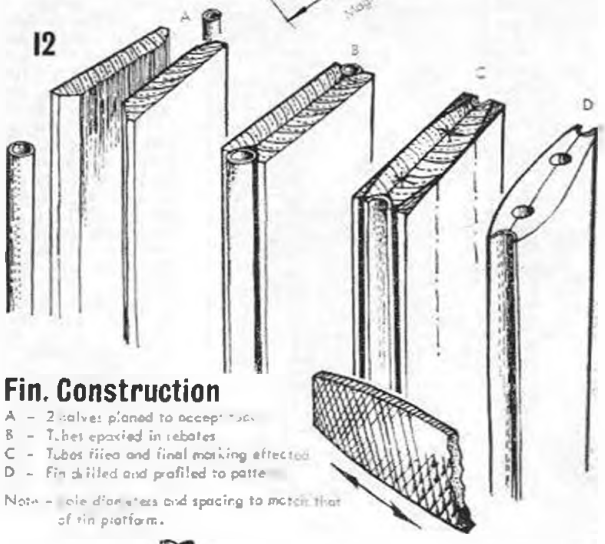
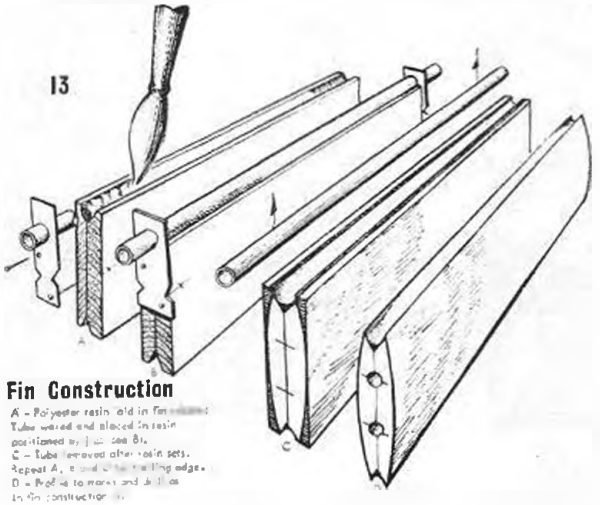


Fin. Construction

A – 2 halves planed to accept tubes
B – Tubes epoxied in rebates
C – Tubes filed and final marking effected
D – Fin drilled and profiled to pattern

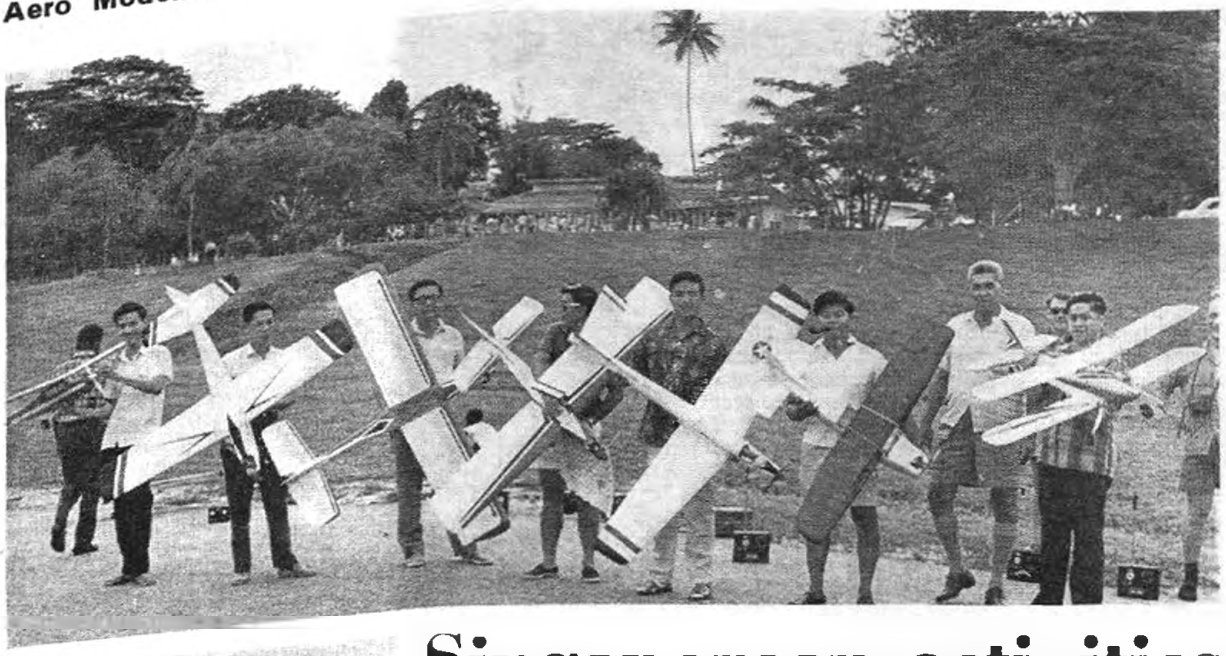
Note – hole diameters and spacing to match that of fin platform.

13



Fin Construction

A – Polyester resin slid in fin recess
Tube waxed and blocked in resin positioned by jig – see B1.
C – Tube removed after resin sets. Repeat A, and file leading edge.
D – Profile to marks and drill as in fin construction (1).

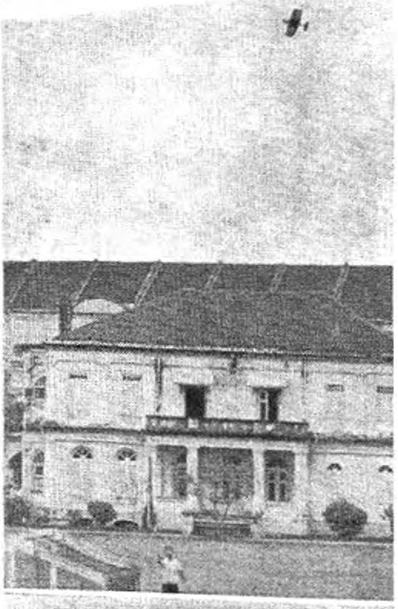


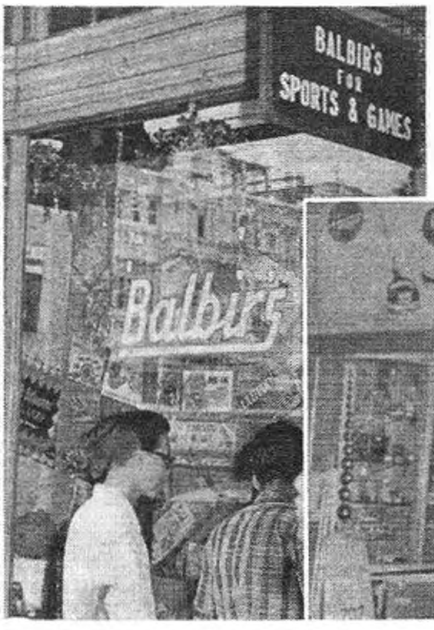
Singaporean activities

TO ANYONE following the political tug of war over defence commitments in S. East Asia, mention of Singapore must conjure thoughts of a fortress bristling with armament and security-bound to the extent of prohibiting movement. But today's Services have learned how to relax. The Royal Air Force enjoys a five day week and at Singapore, its personnel can relax in an atmosphere of content that makes it a top choice posting. During our recent visit, we had the opportunity of enjoying the almost constant 80 deg. F temperature, and the flat calm that follows a daily monsoon rain.

The tropical undergrowth which fills in the gaps remaining from dense domestic and industrial development leaves little space for general aero-modelling, but this is more than compensated by the use of R.A.F. Stations at Changi and Tengah. Again because of the terrain and proximity of the sea as well as profundity of thermals, free flight is hazardous and attracts few followers. In fact it is only permitted at Tengah for RAFMAA members.

In consequence, interest is predominently radio control and the local trade in a tax free port ensures that the latest equipment is available at low prices.



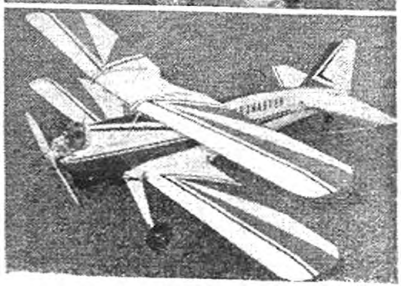


Heading shows Singapore modellers at Changi with variety of R/C kit models. Left is typical Sunday morning C/L activity on playing field of Raffles Institution near city centre. Bottom left, flying stops to allow a V.C.10 to use the perimeter track. Arrivals from U.S.A., N.Z., Australia and U.K. frequently include modellers who call on the popular shops, Balbir's in the City centre specialising in European imports and balsa or Shing Fatt at Changi, who carries Japanese equipment and kits.

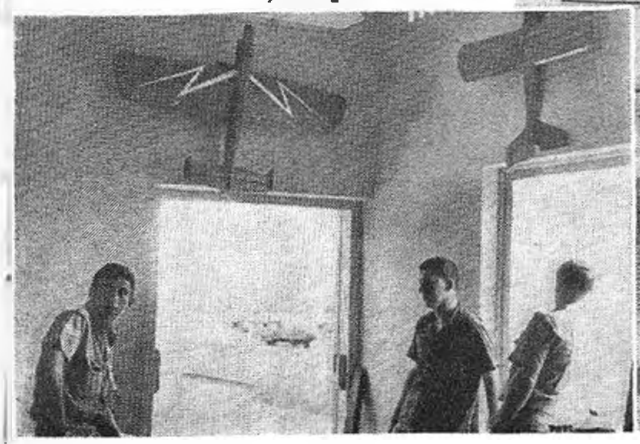
Current rages during our visit were the Hinode digital propo for rudder plus progressive throttle control complete at approximately £30, the Webra 61 R/C and Enya 60, Kraft & Orbit single stick digital and the Japanese pre-cut MK Kits.

Sport R/C flying from the perimeter track at Changi, only 150 feet from the RAFMAA clubroom brings Service and local modellers together each Saturday and Sunday in idyllic surroundings.

Flying is punctuated by arrivals of Transport aircraft and the occasional disappearance of a model down a monsoon ditch—or in our case by the arrival of Father Christmas by parachute from a Twin Pioneer! Standard of construction and finish on the models is above British average despite the fact that the useful life of any model is relatively short as all year round activity and such fine facilities tempt one to do more flying and the humidity brings with it glue failures. But the Singaporean modeller takes all this in his stride. He is generous in hospitality, genial in nature and "genned up" on his hobby which he enjoys to the full, thanks largely to the co-operation of the Royal Air Force.

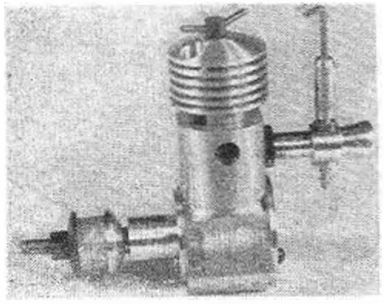


Top left, T. S. Lim taxis his Enya 45 Stormer with Kraft single stick propo. also seen in hands of top local flier Fong Yeng See (centre). At right T. T. Wee uses Bonner Digimite for his Falcon 56 with K&B 45. Right, top to bottom: Chief Tech. Cyril Edwards with Mills .75 Sharkface, and wife Doris; Flt. Lt. Tom Whittle holds J/T Pete Everitt's Tauran with Metz 10 and Webra 61; Kevin McGrath is in A.T.C., Dad is a Warrant Officer and chief chaser! Kevin's model is a Topsy with Merlin and Futaba/Hinode single channel. Bottom, Fong's beautifully made Aeromaster Bipe. Clubroom interior at left is Changi with C.130 on perimeter outside; at right is Seletar clubhouse, a Jap control tower 24 years ago.



LATEST ENGINE NEWS

By Peter Chinn



The new Moore and Bailey "Embee 75" sideport diesel from Leicester will fill a long felt want for a Mills .75 replacement engine.

New British Small Diesel

Entirely new British engines are somewhat rare these days, so it makes a pleasant change to report the appearance of the "Embee 75", a diesel of 0.75 c.c. nominal displacement, from a concern new to the model engine market, Messrs. Moore & Bailey, of Groby, Leicestershire.

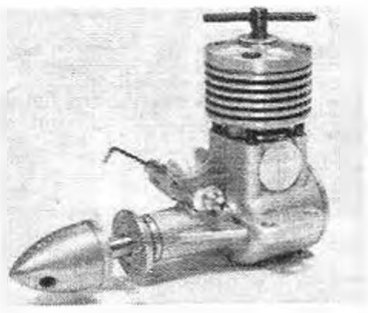
We will have an illustrated description of this motor in next month's issue but, in the meantime, a few words about it may be of interest.

Firstly, to the younger modeller, the Embee 75 will look quite different from the engines which he has become accustomed to seeing. In contrast, anyone whose modelling activity dates back to the immediate post-war years will almost certainly find something vaguely familiar about it. Had we been handed the Embee with no explanation as to its origin, we confess that we would have assumed it to have been made about twenty years ago: a model engineer's one-off special or one of the better commercial efforts which failed to get started production-wise.

In other words, the Embee is, frankly, old-fashioned in appearance. In certain respects, it is, in fact, reminiscent of the Mills engines made between 1946 and 1964. Like the Mills 1.3 and .75, the Embee uses piston controlled induction, the carburettor being mounted at the rear behind the cylinder. Also like the Mills, it employs a small bore, long-stroke layout and small port areas and, like the Mk. I 1.3's, has a machined all over natural aluminium finish.

Identification with the Mills is not a bad thing and could, if the Embee matches the Mills in reliability and ease of handling, actually help to get it established. There are, after all, a lot of modellers who have greatly regretted the passing of the Mills. Mills engines were not discontinued because there was no longer any sale for them but because, after the acquisition of Mills Bros. (Model Engineers) Ltd. by the Ayling Industries Group, the management found that their facilities were more and more committed to other fields of industry, necessitating finally, their withdrawal from the model engine market in mid-1964.

We understand that the retail price of the Embee 75 will be £3.10s. including purchase-tax.



A competitively priced small diesel, the Hungarian FOK-10 which is advertised in the U.K. as the Ripmax F-10. It is just under 1 cc. capacity.

Taipan 1.5 D.

Outside the United Kingdom, the No. 1 model engine manufacturer in the British Commonwealth is Gordon Burford & Co. Pty. Ltd. of Grange, South Australia. Gordon has recently sent us one of his current Taipan 1.5 Diesel motors and a very neat little job it is too with an excellent crankcase casting, nicely produced machined parts and a clean uncluttered appearance.

The design of the Taipan 1.5 is quite straightforward, incorporating shaft rotary valve induction and a radially ported cylinder. Three exhaust ports are used with an internal flute type transfer port between each. The cylinder screws into the crankcase and is topped by a machined aluminium finned jacket also screwed on. A flat crown piston and a machined aluminium connecting-rod are featured.

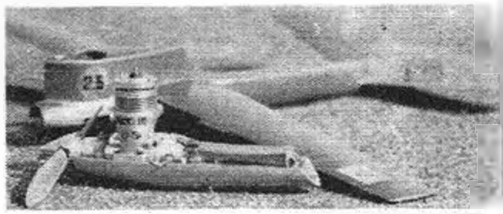
The Taipan 1.5 has a bore and stroke of 0.511 by 0.452 in. giving a swept volume of just over 1.5 cc. It weighs 3.8 oz.

Burford engines are distributed in the U.K. by Performance Kits of Sandy, Bedfordshire. Presumably they will now cost more as a result of devaluation of Sterling but, as Australian products, they still enjoy the benefits of Commonwealth preference in regard to import duty which should mean that they will remain reasonably priced.

The Taipan 1.5 cc. Diesel, a robust and well-made product from the Australian Burford factory.

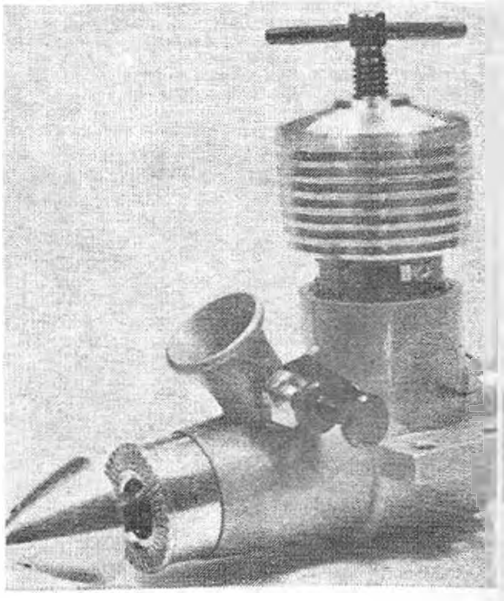
New Russian Stunt Engine

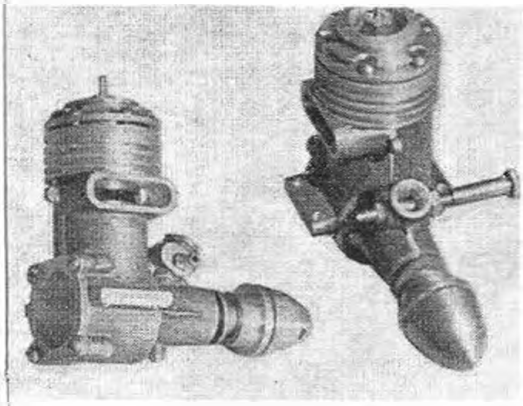
Karl Plotsin, our U.S.S.R. correspondent, sent us the two photographs of the Russian "Poliot 5.6" engine. This is a new motor, destined for regular production this year and is the first Soviet motor to be designed expressly for control-line stunt use. It is the work of Boris Kraznorutsky. Kraznorutsky is one of the leading exponents of team-racing in the U.S.S.R. and was a member of the team that took the 1967 Soviet team-race championship.



K. Mihara of the O.S. engine design staff, won the 1967 Japanese Nationals 2.5 cc. speed class with this model powered by a special rear induction O.S. Max-15.

The Poliot has a displacement of 5.6 c.c. Therefore it is nominally a "35" and is presumably intended to overcome Russian dependence on foreign 35 cu. in. stunt engines in this popular class. Although the circular head fins and spinner-nut give it an appearance somewhat different from the typical western stunt 35, it is, in fact, similar in construction to the usual run of engines of this type and follows the normal shaft rotary-valve, loop-scavenged layout.





Two views of the new "Poliot" .35 C/L stunt engine now going into production in the Soviet Union.

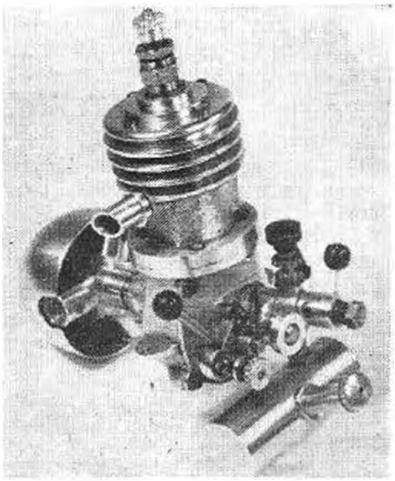
A one-piece crankcase/cylinder/main-bearing unit is used, with drop-in cylinder-liner and detachable backplate held on with four screws. The lapped piston has a flat crown and a straight baffle and is coupled to a plain unbushed conrod. The crankshaft is of the full disc web type with crescent counterbalance and a rectangular valve port. The engine has a machined aluminium prop driver fitted to a split taper collet on the shaft. The needle-valve assembly is of the usual spraybar type.

Ripmax F-10

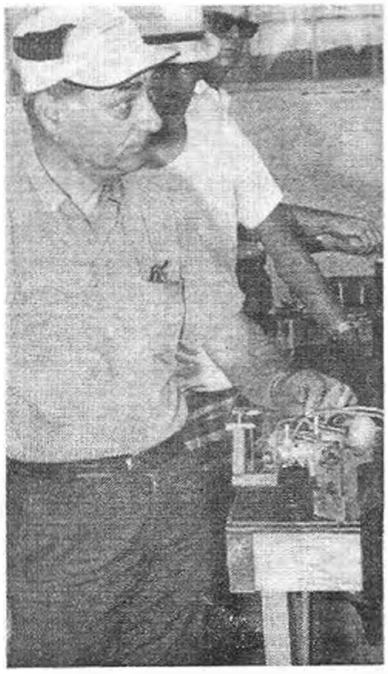
Last June we published a report in the Engine Test series on the revised version of the 2.47 c.c. FOK-25engine that is sold in the U.K. as the Ripmax F-25. This is one of three Hungarian made FOK engines imported by Ripmax, the other two being the FOK-15 (1.47 c.c.) and the FOK-10 (0.94 c.c.).

An example of the latter engine is seen in one of our photos. In general, the design follows that of the 2.5 c.c. model except for the cylinder porting which is of the reverse-flow pattern featuring two diametrically opposed exhaust ports with opposed internal transfer flutes between them. (In the current version of the 15 and 25, a loop-scavenged system is used instead).

Structurally, the FOK-10 features a gravity-cast crankcase in which the hardened steel crankshaft runs direct. The cylinder is also hardened, is located by an annular seating in the crankcase and has its upper part encased in a finned alloy jacket. Four screws tie the complete cylinder assembly to the crankcase. The piston is of cast-iron with a flat crown and is coupled to the aluminium connecting-rod with a pressed-in gudgeon-pin.

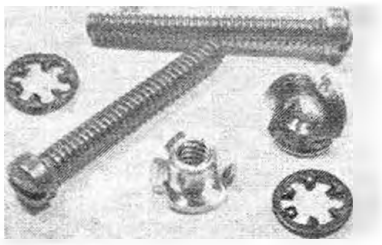


Right, really sensible is this set of four special mounting screws and nuts supplied by the manufacturer for use with Burford Taipan engines. Above, not exactly new, but this 1934 spark ignition engine now with Jim McCann of Newcastle on Tyne was made by a Mr. McDonald and has rear disc induction, surely one of the first.



Ben E. Shereshaw who designed the "Air Trails Sportster" in this issue, runs up his twin at the U.S. Nationals in the hangar by the "Old Timers" display. Engine is eventually scheduled for production.

The engine has a bore and stroke of 10 mm. by 12 mm. and weighs 2.9 oz. As the photo shows it is attractively proportioned. Incidentally, all the external machined aluminium parts (i.e. cylinder-head, prop drive assembly and backplate) have a gold anodized finish.

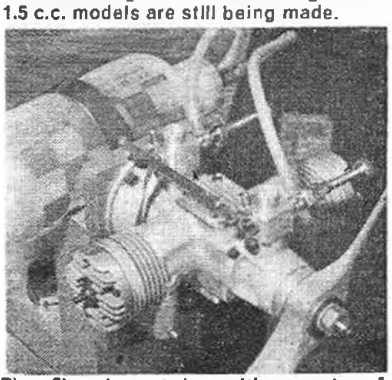


So many people responded to West German Rolf Miebach's offer in Reader's Letters to rework Super Tigre G.15's for Tuned Exhaust pipes that we thought readers might in turn want to see what Rolf looks like. Here he is at the 1967 Criterium of Europe.

Discontinued Engines

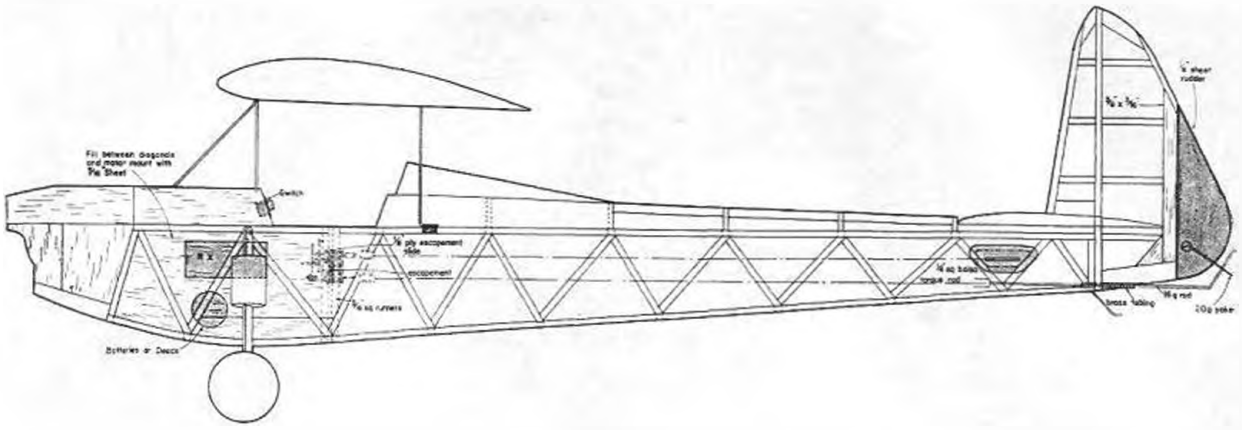
Bill Selzer of the L.M. Cox Manufacturing Company of California tells us that their most powerful engine, the Cox Special 15 Mk. II is being dropped from production. No other change is contemplated in the Cox engine range for 1968, which now numbers a round dozen models. These comprise five Tee-Dee series motors (.010, .020, 049, 051 and .09), three Medallion series (.049, .09 and .15) and four reed-valve models (Pee-Wee .020, Babe-Bee .049, Golden-Bee .049 and Q.Z. .049).

The John Olivers state that the Tiger-Major 3.5 c.c. diesel has been discontinued. Demand for 3.5 c.c. diesels is rather small and, by dropping this model, Oliver Engineering are better placed to cope with the current brisk demand for the 2.5 c.c. Tiger Mk. IV. Some Tiger-Cub 1.5 c.c. models are still being made.



The Shereshaw twin, with a pair of carburettors having separate feeds, as seen at the U.S. Nats. Big problem, as Davies Charlton and others before have found with twins, is that of unequal mixture control in the cylinders.

Contrary to the hopes expressed in the January issue, Dynamic Models Inc. are not planning to re-enter the model engine market. "Hi" Johnson has assured us that they are still busy with engine market. "Hi" Johnson tells us they are busy with slot car products.



Strictly Simple . . .

David Boddington selects four typical scale subjects for conversion to rudder only radio control from free-flight

IN THE "Strictly Simple" columns last month I suggested various scale models from the A.P.S. Free Flight scale range that should be suitable for conversion to radio control. With only a limited amount of space to write about such a large number of models it was not possible to deal in any detail with the radio installations.

Now we have taken four typical examples of these scale types to illustrate how it is possible to convert from free flight to radio control.

Before considering the individual models there are some basic points common to all the installations regardless of the type of equipment used and these must be strictly adhered to.

1 Keep to the centre of gravity (balance point) indicated on the plan. You may experiment with varying the position after you have carried out successful flight; but initially balance the model where indicated.

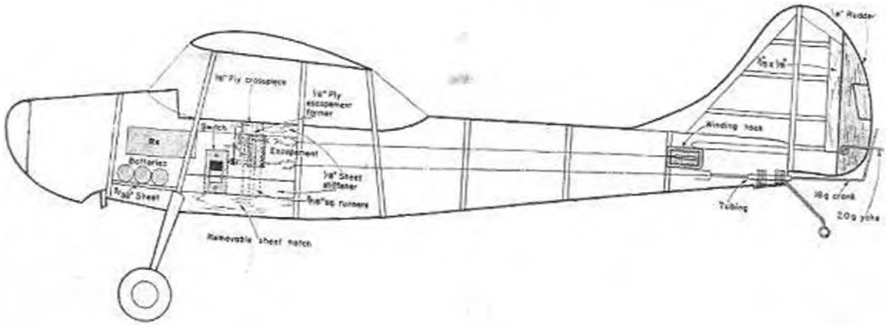
2 Control surfaces (i.e., rudder) must be freely hinged and offer no resistance when moved; they should be sufficiently free to fall to one side due only to the self weight of the surface. Similarly torque rods and pushrods should be free from "binding" and clear of obstructions.

3 The Radio control equipment must be operating 100 per cent satisfactorily before it is installed in the model. A scale model is normally more "valuable" due to the extra time and care involved in its construction and it is not the type of model to try out new or suspect equipments. Thoroughly flight test the radio and actuator in an "old banger" before changing over to the scale model and to test it thoroughly again after installing in your new model before flying.

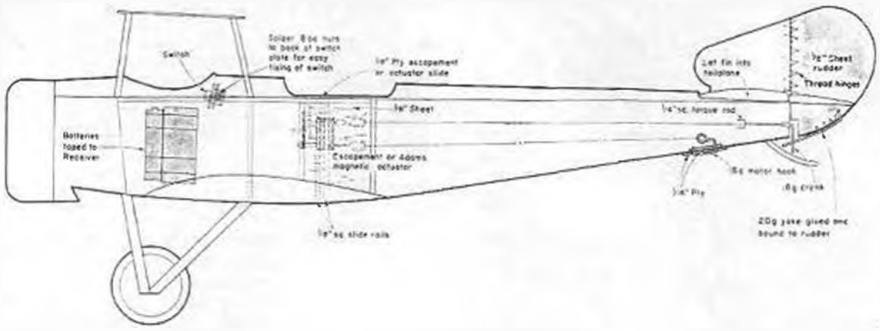
4 You have probably taken a lot of time and patience in building and finishing your model but do have a little left when it comes to the time of the first flight. Do wait for a day when there is little or no wind and do carry out all of the preflight checks conscientiously.

5 If you really haven't had much experience of radio control flying or you are not too proficient at it, be honest with yourself and ask a colleague to carry out those initial test flights. Perhaps he will not be able to prevent the odd crash on the early trimming flights, but be sure that if you had been on the button a complete write-off would probably have occurred.

I do not propose in this article to explain all the test flying and trimming procedures as they have



Everything about the Cessna Bird Dog makes it ideal for a scale flier, and with simple alteration it accepts an escapement on a sliding bulkhead and receiver and batteries through a belly hatch. The Plan FSP 568 costs 5s. 6d. inc. post. David Boddington advises increasing the U/C wire height to clear the Rx in the fuselage and perhaps a more positive wing fix, the free-flight design is "knock-off".



Left: The Parasol wing Luton Minor for up to 1 cc. is a "natural" conversion for R/C with open cockpit for equipment access and simple rudder mods. Wings are "knock-off" held in place with scale struts. Nose is filled with 3/16 in. sheet. Plan FSP 534 is 5s. 6d. inc. post. At right is the Sopwith 1½ Strutter Biplane, also ideally suited with cockpit access, in this case, one cockpit for each part of the R/C equipment. Rudder is practically scale size in this case. Pendulum elevator is not used. Plan FSP 907 is 8s. inc. post.

been covered in previous articles. Suffice it to say that there is no short cut to trimming out a model correctly but if the model is built accurately and without warps you should get off to a flying start.

Now for the actual examples and firstly the:—

Luton Minor

No worry here with available space for the radio equipment, it will easily take any of the modern S/C radio systems. Mount the escapement on a removable slide (and reasonably long leads to the escapement) to allow for easier access to the batteries and receiver. The switch and charging socket can be mounted on former F2 (instrument panel) if desired. Pack the Receiver and batteries in foam rubber.

Cessna Bird Dog

A similar type of installation to the Luton Minor can be used in the Bird Dog the main difference being that the equipment is accessible through a removable sheet balsa hatch in the underside of the fuselage. Again a removable escapement slide is used to allow the Rx and batteries to be positioned more easily. Use only lightweight radio equipment, particularly if the D.C. Dart (as indicated on the plan) is used.

Sopwith 1½ Strutter

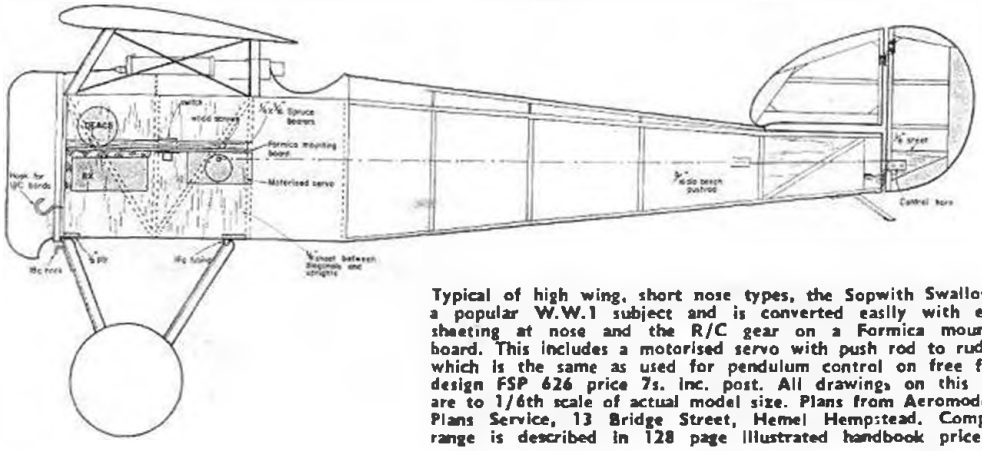
Use can be made of the relatively large cockpit apertures for fitting the R/C equipment. This, of course, assumes the use of a miniature receiver: it is certainly preferable to avoid forming removable hatches in the cockpit coamings to avoid weakening this area. The use of a magnetic actuator would definitely be an advantage in this and similar 1/12th scale biplanes but the Strutter should perform well enough with escapements. I would suggest that the pendulum elevator system is omitted. however, if anyone has tried combining R/C rudder operation with pendulum elevators I should be pleased to hear of the results.

Strap the U7 batteries to the receiver, to keep the overall size as small as possible, and pack around this unit with foam rubber. By increasing the depth of former F6 the switch can be mounted on this 1/16th ply former. Keep the movement on the rudder to a maximum of ¼ in. movement at the trailing edge of the rudder for first flights.

Sopwith Swallow

As an alternative to escapements shown, a motorised servo can be installed in this model. I personally dislike this form of actuator but I know many use them. The Rx, Deac's or batteries, servo and switch are all mounted on a board for ease of putting in and taking out of the model. One advantage in using a motorised servo is the fact that a pushrod connection can be used as opposed to a torque rod and this simplifies the attachment to the rudder. As with all of the short nosed models the main bulk and weight of the radio equipment should be kept as far forward as possible.

Next month we shall be featuring a full size plan of the Aermacchi Santa-Maria for the popular .049 radially mounted engines, the Cox QZ .049 in particular.



Typical of high wing, short nose types, the Sopwith Swallow is a popular W.W.1 subject and is converted easily with extra sheeting at nose and the R/C gear on a Formica mounting board. This includes a motorised servo with push rod to rudder, which is the same as used for pendulum control on free flight design FSP 626 price 7s. inc. post. All drawings on this page are to 1/6th scale of actual model size. Plans from Aeromodeller Plans Service, 13 Bridge Street, Hemel Hempstead. Complete range is described in 128 page illustrated handbook price 2s.

Free Flight Comment

by John O'Donnell

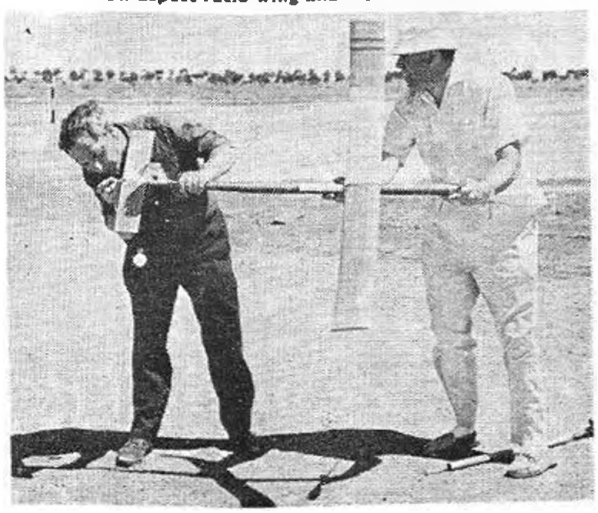
RESULTS from the two International **Postal events** mentioned last month are now to hand. These were organised by the **Woomera M.A.S.** of South Australia in one case, and by the **N.F.F.S.** of the U.S.A. in the other. As both were held in October it is hardly surprising that they overlapped to some extent, and it is consequently convenient to report them together.

The Australian event was relatively small with 45 submitted scores (spread over 4 events) out of a pre-entry of 74. Perhaps the requirement of pre-entry proved a limitation. Certainly there were complaints in some quarters regarding the fee, but I wonder how many simply couldn't be bothered with International Money Orders and the like.

Nevertheless the U.K. was well represented as a glance at the results will show. These are a little embarassing to report as some people already think that this column has too much on "How I won the War". Congratulations are due to Annie Gieskieng of Denver, Colarado for *winning* FAI power; and to Andre Merritte who managed an impressive score of six consecutive maxs in Coupe d'Hiver, flying at St. Genevieve des Bois in cool conditions varying from morning mist to a windy afternoon.

From what Dan Taylor wrote the host club have not mastered the thermals out there. These are described as small, turbulent and short lived—despite temperatures well over 95° F. Nevertheless ex-Hayes member Roy Wotton managed within 7 seconds of a treble in Cd'H.

Above: Dan Taylor launches Cd'H at Woomera for Postal event, has 168 sq. in. wing, 42 sq. in. tail, 16 x 18 prop slow climb but fine glide. Below, D. R. Wotton has Wake fuse lit at Woomera, placed 5th in Postal, uses outrigger prop baldes, low aspect ratio wing and B 64066 section.



The **"Dick Black Indian Summer Postal Contest"** was larger—with 125 fliers in the combined F.A.I. event alone. This included half of the Australian results, mainly British scores made at the Northern Area F.A.I. Meeting at Topcliffe. There was no discrepancy in the U.S. postal between entries and scores, as participation was *free* and it was merely a case of N.F.F.S. members and invited overseas clubs submitting their results. In fact there were more overseas entrants than American. Percentage wise both postals had a similar breakdown of the F.A.I. categories, with about 60 per cent being A/2's.

From perusal of the score sheets there is no doubt that California is the place for high times, as demonstrated by Jim Trego, John Smallin, Steve Geraghty and Lee Polansky. These gentlemen collected combined F.A.I., combined A.M.A. A/B/C Gas, O.H.L.G., and A.M.A. ½A Gas respectively. The other two events were won by British modellers. Martin Dilly made his winning C d'H flights at Chobham on a Tuesday (a technique not allowed by the Australians) and must have known not only where to find lift but also timekeepers!

The sports precision event (target was 1 minute with D.T's barred) was won by John Bailey flying a Coupe d'Hiver model. Incidently, he is going to be absent from the British Contest circuit as he has just acquired not only a wife but a new job in Zambia. Mention must also be made of George French's second place in F.A.I. using his Northern Area F.A.I. Meeting flights.

Team Events were held simultaneously—with A/2 the most hotly contested by far. Winners were the Austrian Salzburg Club just a few seconds in front of S.C.A.T. British successes came from Cambridge winning the combined A/B/C power event, and Crawley collecting the Coupe d'Hiver. I gather that Tony McCombie and the Millers have mixed feelings about flying to the American 5 min max. This is not unique as a couple of U.S. Clubs made "token" (or was it protest?) entries using either 3 min maxes or short engine runs.

All-in-all these events seem to satisfy some tastes, despite their obvious limitations as serious contests. I wonder, however, about the *timing* of the events. Apart from their being staged simultaneously I wonder about the choice of October—always a very busy time in the British contest programme. There is a lot to be said for choosing the middle of summer when domestic events are *fewer*, and where evening (even on weekdays) flying could well be practical.

WOOMERA F/F POSTAL, held during October
A/2 *(18 returned scores)* 1. J. O'Donnell (U.K.) 843; 2. J. Clements (U.K.) 785; 3. D. Oldfield (U.K.) 762; 4. M. Dilly (U.K.) 756; 5. M. C. Reeves (U.K.) 742; 6. Sgt. B. Baines (R.A.F. U.K.) 733.
Wakefield *(8 returned scores)* 1. J. O'Donnell (U.K.) 816; 2. E. Collins (U.S.A) 781; 3. A. Butler (Australia) 733; 4. V. Wellsted (S. Africa) 711; 5. D. R. Wotton (Australia) 691; 6. M. van Eyk (S. Africa) 645.
F.A.I. Power *(10 returned scores)* 1. Ann Gleskieng (U.S.A.) 829; 2. B. Hooley (U.K.) 800; 3. A. Moss (U.K.) 688.
COUPE D'HIVER *(13 returned scores)* 1. A. Merritte (France) 360; 2. D. R. Wotton (Australia) 353; 3. H. Tubbs (U.K.) 306; 4. R. Kenward (U.K.) 297; 5. R. Garrigeu (France) 292; 6. A. Cornavin (France) 222.

N.F.F.S. Fall Postal
COMBINED F.A.I. *(125 returned scores)* 1. J. Trego (U.S.A.) (Power) 1,544; 2. G. French (U.K.) (Power) 1,352; 3. B. Donn (U.S.A.) (Wakefield) 1,102; 4. J. West (U.K.) (Power) 1,057; 5. B. Van Nest (U.S.A.) (Power) 1 040; 6. J. Whittles (U.S.A.) (Wakefield) 982; 7. D. Reed (U.S.A.) (A/2) 894; 8 D. Derda (Yugoslavia) (A/2) 871; 9. B. Hartill (U.S.A.) (Power) 855; 10. H. Franck (Austria) (A/2) 852; 11. B. Halford (U.K.) (Wakefield) 848; 11. B. Bogart (U.S.A.) (A/2) 848.
Sports Precision 60 sec. Target *(24 returned scores, total error 3 flights)* 1. J. Bailey (U.K.) (CdH) 3, 2. K. Stevens (U.K.) (A/2) 4; 3. S. Geraghty (U.S.A.) (HLG) 6; 4. M. Reeves (U.K.) (A/ax) 8; 5. D. Newth (U.K. (A/2) 12; 6. L. Haalam (U.S.A.) (CdH) 14; 7. L. Taylor (U.S.A.) (Hcotr) 15; 8. C. Borneman (U.S.A.) (HLG) 19; 9. T. Dannels (U.S.A.) (Twin Push) 19; 10. N. Roser (Hungary) (A/2) 20.
A.M.A. A/B/C Gas Combined (5 Min Max.) *(21 returned scores)* 1. J. Smallin (U.S.A.) 1,395; 2. T. McComble (U.K.) 882; 3. D. Miller (U.K.) 835; 4. B. Schlatm (U.S.A.) 803; 5. C. Duthie (N.Z.) 771; 6. G. Geraghty (U.S.A.) 751.
AMA Hand Launched Glider *(14 returned scores)* 1. S. Geraghty (U.S.A.) 616; 2. L. Simpson (U.S.A.) 420; 3. I. McEldowney (N.Z.) 358; 4. P. Lagan (N.Z.) 336.
A/2 Glider Team Results 1. LSV-Salzburg (Austria) 2,459; 2. S.C.A.T. (U.S.A.) 2,446; 3. Christchurch MAC (N.Z.) 2,412.
Coupe d'Hiver 1. M. Dilly (U.K.) 399; 2. T. Hutchinson (U.S.A.) 334; 3. W. Wasser (U.S.A.) 320; 4. C. King (U.K.) 308; 5. Shirley Horton (U.K.) 306; 5. H. Tubbs (U.K.) 306; 7. J. Saba (U.S.A.) 301; 7. P. Cameron (U.K.) 293; 9. B. Stalick (U.S.A.) 282; 10. W. Rozelle (U.S.A.) 272.

Model gadgetry has been much in the news of late, especially since the World Championships. As regular readers will hardly need reminding (after last month) I am not very convinced about the merits of devices intended to improve efficiency *directly*, e.g. ball race prop. shafts. However, trim-changing mechanisms are another matter as they permit model adjustments to be reconciled much better to the differing requirement of climb and glide.

Auto-rudder is now universal on glider and so common on power that it hardly counts as gadgetry any longer. Auto-Stab (or V.I.T.) has hardly reached this stage, although it is becoming very common on F.A.I. power. There are many systems employed but a few are illustrated in the accompanying sketches. Timing of the movements is probably worth mentioning. Simultaneous actuation of engine cutout, rudder and tail is easiest to rig, but can (and for me, did) produce a loop at the top of the climb. After simultaneous engine shut-off and rudder movement an approximate 2 second delay before tail movement seemed about right on my models. A longer delay produced an initial dive on glide, with a stall thereafter.

There is one advantage of V.I.T. on power models, that is probably not widely appreciated. It is possible to *trim* with the tail set to move straight from the power to the D.T'd position. This gives a quick D.T. just after the engine cuts, *without* the risks attendant to having the tail "pop" under power. With this setup the full power short run technique is a quick, practical and safe method of trimming.

Rubber models are a much more difficult problem (even though things don't happen as quickly) as the energy/thrust/torque varies throughout the climb.

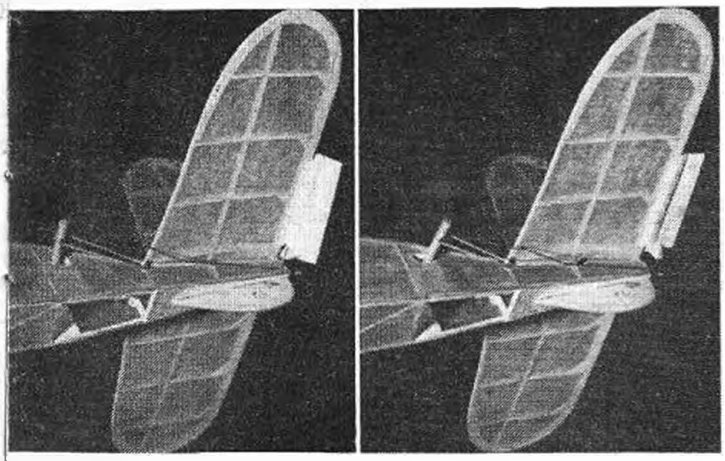
To obtain a model that will be stable, never mind efficient, under such extremes implies that a number of variable and interacting forces be balanced at all times. This *can* be achieved with "fixed geometry" rubber models that will fly with the same settings on either high or low turns. Presumably propwash and the like introduce compensating effects as appropriate. Such a setup cannot be *designed*, but it can be *developed*—and it is the basic reason why I have persisted with the "Maxie" and its derivatives for so long.

However, other layouts (with perhaps superior potential) do not always possess this characteristic and some sort of mechanical trim change may be desirable. First ideas on this seemed to be variable downthrust (Sadorin, circa 1949) or variable pitch propellers. The latter was convincingly demonstrated on indoor R.T.P. models in the mid 1940's—but has only recently been successfully "scaled-up" for outdoor application. (Thin swept forward and flexible propeller blades can produce some of the same effects—but do not permit precise control). The principle is to have an extensible connection between propeller shaft and blade so that increased load (due to increased lift and drag at high revs) produces a compensating effect, i.e. higher pitch.

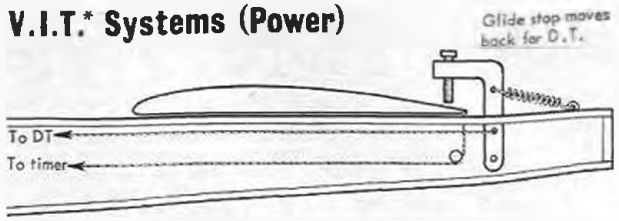
The other current trend is to alter the decalage (longitudinal dihedral, or incidence difference). This can be done by moving either wing or tail—in whole or in part. Some systems have featured a sudden change, usually initiated by a clockwork timer

Continued on Page 160

M. Reeves' unique Keil Kraft Ajax with VIT elevator, for power at left, glide at right with mobile dowel to actuate via push rod from motor tension. Works well as contest results show.

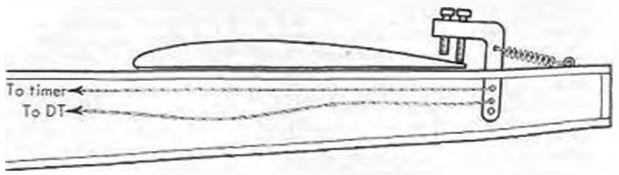


V.I.T.* Systems (Power)

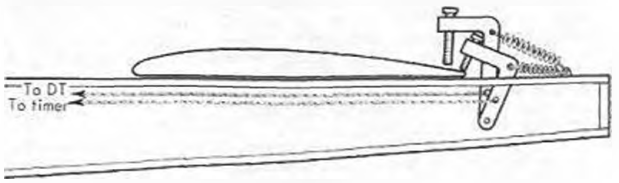


Tail held down under power by line direct to engine timer. Needs large pull to get tail seating rigid.

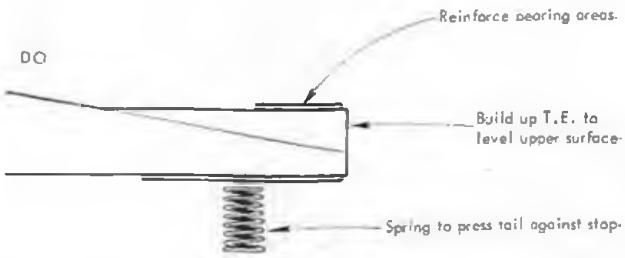
* VARIABLE INCIDENCE TAIL

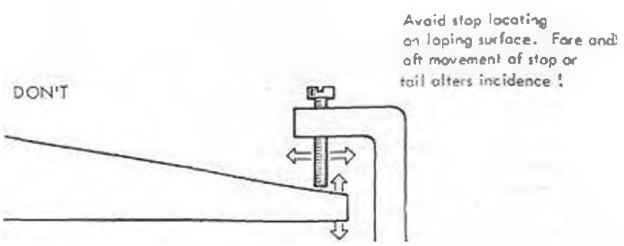


George French system. Stop moves back in two stages. Needs relatively precise workmanship.



Two stop system. Large movement easy to obtain, therefore more tolerance in construction.





CLUB NEWS

(and new badge of the month)

IN SPITE OF the airfield situation, the silencer headache and all the other visitations which are currently plaguing the model movement, many an optimistic model flyer is looking forward to a zestful season's flying. Why not join the happy band?

The newly formed **"Central Herts Aero Modellers"** disdain superstition by acknowledging their membership as standing at the unlucky-for-some figure of thirteen. But youth—ages range from twelve to fourteen—don't often accept such adult fixations, although their approach to the hobby is mature enough, numbering quite a few R/C fans among the host. Sensibly they spread their slim resources by using the two available transmitters on a communal basis. Other club interest is C/L. Secretary is D. MacGregor, of the Limes, 23 Lower Road, Gt. Amwell, Ware. He puts out a request for new members and also advice on getting the embryonic club moving. May I suggest they rope in a couple of older modellers with club experience? Other than that, it's a question of getting somewhere decent to fly and to meet, and letting enthusiasm do the rest.

It is a known fact that disabled people, unable to move around like other folk, often find the time and patience to turn out excellent pieces of model craft. It was thus a fitting and generous gesture of the **Leatherhead M.F.C.** to give a model making lecture to the staff and trainees at the Queen Elizabeth Training College for the Disabled. The six members who gave the talk exhibited some 30 models of every description, including even a 1913 compressed air model. I would like to make the point here that disabled people can join in the fun of the flying field, as some already do, and most clubs would only be too willing to give all the necessary handling and retrieving assistance. The model *"Teach-In"* had its practical side too, with Rubber and Electric r.t.p. models going through their circular paces, working radio gear and a wing flapping gadget called an ornithopter. Farther from home Tony Rogers, stationed with the Army in Gibraltar, reports that overland flying there is virtually impossible (It's the planes on the plain, straying mostly into Spain), so Tony is trying his luck on the territorial waters with flying boats. At least it's one way to acquire a ready-to-hand flying field.

The well-known and long standing *"Eagles Beak"* Magazine of the **Worthing Bald Eagles M.A.C.,** is now produced in booklet form with bold cover complete with club crest (no, not a crown topper) making for a businesslike presentation. Same features as the old mag, though not, we hope, the same old jokes. Alas, I am too much of an old fuddy duddy for the slick humour of Nigel Tusk to penetrate my elephantine consciousness, but I can at least respond to the thoughtful editorials of John Bashford. The last issue I looked at was rather thin in content, but I trust that further, more voluminous issues will be forthcoming. One point that caught my attention in the mags was the militant idea that airfields do not go begging, rather do you have to do some heavy canvassing of landowners and farmers in order to find the odd rod or two of the Fuller's product. Faint heart and all that.

If you believe in a spot of arm swinging to warm up the system in winter then Chuck Glider is just the answer. We trust then that glowing cheeks resulted from a wintry Chuck Glider event held by the **Sidcup and Eltham Club.** The Senior part of the proceeding was a one off design affair, which was won by P. Noble, and for the Juniors an open design comp., in which honours went to W. Sampson. Another Winter event was a Combat contest for up to 3.5 cc. motors. The result was decided in rapidly failing light in a three in a circle final. The favourite, Richard Wilkins, lived up to his reputation.

Piratical thoughts should, of course, be the rightful prerogative of the **Buckaneers Model Club,** and they get fulsome expression in the Newsletter editorial. The writer would not like to be thought a "right wind deviationist" (just a typographical error, I am sorry to say) but suggests, in his revolutionary way, that factors other than silencers, or rather the absence of them, are responsible for the loss of flying fields. He may well be right, but apart from the inexorable demands of encroaching modern society, flying areas are lost for two reasons: noise and nuisance. And the two all too often go together. In the same issue Peter Gardner sticks out his neck by suggesting that, with modern kits and radio gear, there is no reason why the radio novice should not have success from the word go. He goes on to advise the beginner that the help and guidance to get that first model safely airborne should be sought from the club experts even before the model is built. He is *so* right. All too often you see a radio newcomer floundering with a too heavy, too powerful, hyper-critical model; the type of thing that would require quite a lot of sensitive adjustment by an expert even without that six degree warp on the port wing. And where to get those models flying in proper trim? Well, the club, has the use (along with other S.M.A.E. clubs in the South Midlands) of Henlow Airfield. Only snag is the full size gliding that litters the ground with a web of lethal winching cables. I know from personal experience how maddening this can be to have these wires whipping between your legs—it can even cause split personality.

Youthful attendance at club meetings is often limited by the demands made on the citizen of tomorrow, exam wise. At least the **Glasgow Hornets M.A.C.,** in their newsletter, ascribe "O" level commitments to "O" level attendances at meetings. Perhaps this answers the vital question of where Hornets go in winter.

The **Dewsbury M.A.C.,** recently held its first C/L Rally. It proved to be quite a success in spite of a somewhat low entry. Weather was fine but cold, and the refreshment pavilion provided welcome and warming sustenance. Novice Stunt and Rat Race were the programmed events, but a Combat extra was put on for the **Birmingham** boys who turned up with just that sort of kamikaze equipment. E. Shearer won Stunt, Place and Howarth of **Wharfedale** the Rat Race, and the Combat was an all Birmingham draw between Reeve and Wright

The foot and mouth epidemic has restricted model flying in quite a few areas, and although it is hoped the emergency will be over by the time this column appears, model flyers should enquire into the local conditions before venturing on farmland and moorland. This caution is taken from the **Whitefield M.A.C.** Newsletter. Model flyers are asked to console themselves with the thought that other people, particularly racegoers are equally affected. In lighter mood, people attending the *"Bring a Model"* night were reminded that the invitation did not include Twiggy. And speaking of twigginess, you need wood of the skinny variety—nothing over 1/16 in. square—for the Indoor Rubber F/F Duration Model described in the mag. A few more details: Wing, 12 in. span, 2 to 3 in. chord, 1½ in. dihedral. Fuselage: 9 in. long, 1½ in. pylon mount. 2 degrees declage. Tail: 4 in. span, 2 in. chord. Prop: 5 in. to 7 in. diameter, carved from block or shaped 1/32 in. sheet paddles on 1/16 in. square hub. Motor stick 1/16 in. x ½ in. You need special tissue and rubber though.

Just to prove the value of the previous paragraph, the **East Grinstead Club** is yet another group who enjoy the delights of indoor flying. This they do in a large hall which, by good fortune, they have the use of. All types flown, including Indoor Chuck. Micro Rubber, Jetex Speed and r.t.p. Scale. Indoor Chuck record is 12 seconds; the ceiling, rather than the sky, being the limit. Good club idea was to hold a Christmas party for all—wives and girlfriends invited. Foot and mouth has reduced flying to C/L only. On a recent outing a member brought along a C/L "T" Tray (do you launch or serve it?) but after modifications it finished up as an "L" configuration.

Cosmo Aeromodelling Club (Bexley, Kent) is a friendly, family sort of club with a strong nucleus of paternal seniors. I can personally vouch for the V.I.P. style welcome given to the special guest to the Club's Annual Open Night and Prize-giving. *"Meccano"* mag Editor, John Franklin, was afforded the red carpet treatment this year, the 15th such occasion since the club was founded by the present President, Mr. A. Crick. The local press gave a good picture and story coverage in which reference was made to the club's good fortune in having the use of Danson Park for all branches of model flying.

At least the R.A.F. has no archaic illusions about the true status of model flying. In the current **RAF MAA** bulletin it is officially referred to as a "Sport". Oddly enough this has the anomalous effect of putting the hobby—sorry, sport—in the Games and Pastimes class where it comes under the discipline of the Physical Fitness Officer. Could be something

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Free Flight Comment (cont. from P.159)

and timed to occur just after the power burst. Unfortunately this timing should be altered with the turns used, which must complicate trimming. The arrangement can be used to alter *warps* as well by having, say, an adjustable flap on *one* wing. Experiments on these lines by Carl Hermes were described in Frank Zaic's 1964-65 Yearbook.

More complicated but perhaps easier to handle is a progressive movement related directly to motor torque. Plenty of movement can be obtained by attaching the motor to a couple of cantilevered wire arms as per Xenakis' model seen in Czechoslovakia. Alternatively a rotating rear hook could be used instead of a peg. *(Sketches next month.)*

In all cases it would probably be much simpler (and more than adequate) to use an elevator instead of an all-moving tail. Just to show what *can* be done I am including photographs of Mike Reeves' "precision model" (4th in the N.F.F.S. postal)—a Keil Kraft "Ajax" equipped with auto-elevator!! On this model control is by motor *tension*, but it solved some trim troubles.

in that, too. The nearest thing to a 30 mile route march I know is a day's flying on Chobham Common. The Bulletin also stipulates some interesting flight schedule departures from the contest form. Postal events will require 3 x 5 minute maxes for Open Power and Rubber, and 6 x 2½ minutes for Coupe D'Hiver and A/1 Glider. Be interesting to see how it works out.

We made mention in these columns a couple of months ago of a *"Fly-in"* at Woodley. We now learn (or at least I do) that this was the Model Aeronautical Fair staged by the **Maidenhead Model Makers Club.** Another one is laid-on for this year. On the C/L side of things, there has been a decline in Combat support in spite of the success of John Chamberlain at the Nationals. More upswinging has been the fullsome Winter programme, which included film shows and r.t.p. flying. A talk on soldering (no, not by the recruiting officer) is planned for the near future. There is also the February Indoor meeting and the March Jumble Sale. The club meets Friday evenings—new members welcome. Contact H. E. James, 15 Penyston Road, Maidenhead.

Often in the production of Newssheets the enthusiasm of the editorial few is way ahead of the available resources, and this is the one excusable reason why the issues of the **Midland Area News** are not more frequent and voluminous. Trying to run a Newssheet on less than a shoestring can be—well, trying, particularly as it entails knocking out the copy on furtivery borrowed machines. The Editor has, therefore, no recourse but to call upon massive financial backing—at least 10s. to start with. When a permanent typewriter is obtained it is hoped to publish a comprehensive survey of British and foreign radio control equipment. Should be worth looking out for, the editors at M.A.P. have been struggling to do this for ages. No sooner do they publish a list, than the wretched manufacturers change the prices and equipment.

If you look in *Contest Calendar* you see a reference to a Slope Soaring Competition to held by the Sheffield S.A. The venue, yet to be selected, will either be near Holmsforth or Sheffield. The contest to cover both R/C and F/F. Please send foolscap S.A.E. for details to P. Scaife, 44 Todwick Road, Sheffield 8.

Newest newssheet on our list comes from the **Glenrothes Aeromodelling Club.** It goes under the 'catchy' but somewhat pun-worn name of *"Fly Paper"*. The club, we are told, is a founder component of the **East Scotland Radio Modellers.** An organisation which believes in the friendly get-together rather than the highly geared, often impersonal contest. Highlight of the last Monroe "Social" Rally was the showing of an R/C epic film which outpaced "Gone With the Wind" by a good two hours, although we hasten to add the film did not bear the same title. News political in the mag is to the effect that the S.M.A.E. has now wound up its Scottish Area, and, on a basis of mutual co-operation, has agreed to leave Scottish affairs in the capable hands of the S.A.A. Is that one up to the Nationalist movement?

Unlike many activities where the official side of things is taken care of by zealous non-participants, the tendency in the model movement over the past few decades is for the burden of organisation to fall upon the active model flyer. And it says much for the vital concern he has for the hobby that he sustains these duties even though they so often encroach upon his own direct model interests and upset his domestic life. John Pool discusses this matter, of crucial interest to the future of the movement, in the current issue of *Northern Area News*. He suggests various ways by which the burden can be relieved, although personally, I do not believe that putting the model contest on an even more "fly-it-yourself" basis will be productive of anything but absolute anarchy. Cannot we somehow encourage more people to take an interest in contest running and general organisation? It may well be that there is too much insularity in the movement to encourage this.

Plenty to chew on in the **Cambridge M.A.C.,** Newsletter. Just the sort of punchy gen and pithy comment the average member looks for in his newsletter. For instance. Want a good Glo Fuel? Then try a 3 to 1 mix of methanol and castor oil (not to be taken internally). Or for 7 pints of Diesel Fuel: 2 pints ether, 2 pints oil, 3 pints paraffin plus 100 ml of Amyl Nitrate or Amyl Nitrite. Mix well away from the kitchen stove unless you want to be an astronaut. Castor oil can be bought as Castrol "R" or Castrol "M". Quite a boom in F/F in this booming club. There is talk of a super upswinging ¼A job, and it is said that Dick Godden's Wake has a ball race prop assembly that's a masterpiece. Plenty of other models under way. Mike Nelson, for instance, has just built an *Appalachian Dulcimer*, and is talking of taking a year's rest from modelling. I don't know what an App etc., is but it sounds pretty tiring.

What is the function of a newsletter? This question is the subject of the Editorial in *The Thermal*, the newsletter of the **St. Alban's M.A.C.** conclusion reached is not to pump the politics but to circulate the gen. Trouble is the scarcity of gen. so, sorry lads, its back to politics. Silencers may not cause much of a stir at Westminster, but the lack of same do just that a Nomansland, the club field.

That's all for this wintry month. Keep a weather eye open for a glimpse of spring sun through the cold mists.

CLUBMAN.

Coming Events

Feb/March	*Winter Wakefield Events* organised by A. R. Wells, 26 Nelmes Way, Hornchurch, Essex at Chobham Common. Feb 18th, March 3rd, 10th & 17th, fee 2/6d. each day.
February 18th	*Airtech M.F.C.* R/C Spot Landing Contest at Haddenham, Bucks. Further details send to Richarsson, 71 Walton Road, Aylesbury, Bucks. Refreshments available.
February 25th	*Bristol Winter Gala* Rat Racing (with silencers) All-in F.A.I. in rounds, Vintage, at R.A.F. Hullavington.
March	*Halifax Tailless International Challenge Trophy Contest* All March 1968. Attractive rules free, entry forms 1/- each from John Pool, 3 Rothwell Drive, Halifax.
April 7th	*East Grinstead Gala* All in F.A.I., A/1-¼A Power, Coupe d'Hiver. Re-entry, 2/6d. per event. 10.30 start at Chobham Common.
April 7th	*Sheffield S.A. Slope Soaring* R/C, F/F, details from P. Scaife, 44 Todwick Road, Sheffield 8. Venue to be announced.
April 28th	*Devon Rally.* Open R.G.P. Chuck Glider, All-in F.A.I. Coupe d'Hiver at Woodbury Common, Nr. Exmouth.
April 28th	*F.A.C.C.T.Combat Rally.* "A" Combat only. Pre-entry 5/- G. H. W. Johnson, 37 Oxford Road, Kirtlington, Oxon. New Barn Farm, Weston-on-the-Green, Nr. Bicester, Oxford. OH A.43.
May 12th	*Rush Trophy C/L Rally.* ¼A, F.A.I. T/R, Class B Rat Racing (Silencers for R/R). Pre-entry 3/-. A. Laurie, 11 Brentwood Gardens, Grange Estate, Whickham, Newcastle on Tyne. Hugh Wood's Car Park, Team Valley Trading Estate, Gateshead.
June 9th	*Potteries Slope Soaring* Single/Multi R/C. Queries to 9 The Parklands, Rudyard Road, Biddulph Moor, Staffs.
June 16th	*Elliott Control Line Gala.* Rochester, Kent.
June 23rd	*Bath Festival Rally.* Bristol, R/C M.A. Club, R.A.F. Colerne.
June 23rd	*Finchley C/L Rally.* "A" Combat, "B" Combat (S.M.A.E. rules). (Silencers essential.) Pre-entry 2/6d. K. D. Lesser, 28 Squires Lane, London N.12. Glebelands, Summer's Lane, London N.12.
June 30th	*St. Albans Summer Gala.* Open R.G.P. (Simeons Trophy). Vintage, Chobham Common.
July 21st	*Aeromodeller-Shuttleworth All Scale Rally,* all welcome. OldWarden, Nr. Biggleswade.
August 25th	*Torbay Rally* F/F events at Woodbury Common, Nr. Exmouth.
September 1st	*Woodford Rally* (N.W.A.) All classes.
September 7/8th	*R.A.F.M.A.A. Championships.* R.A.F. Hullavington.
September 15th	*South Midland Rally.* All classes. Cranfield.
October 27th	*St. Albans Winter Gala.* All in F.A.I. Coupe d'Hiver A/1 Glider. Chobham Common.

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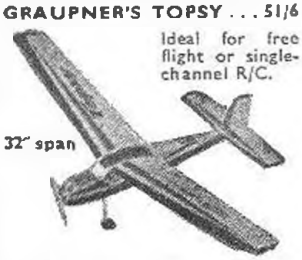
Kit includes two-piece injection moulded fuselage, prefabed sheet wings and tail for INSTANT assembly. Also wheels, adhesive, hardware, etc. Finish in one evening!

Crashproof tongue- and box-wing fixing. Special balancing frame for pre-flight checking. Takes 049 engines. Free flight or even R/C!

GRAUPNER'S TOPSY . . . 51/6

Ideal for free flight or single-channel R/C.

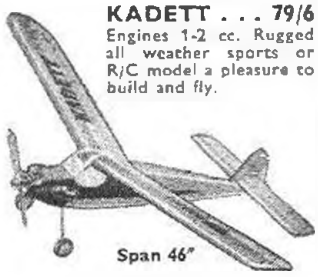


32" span

Smart high wing cabin model with straight-tapered wings. Takes engines up to 1 cc. and performs well on rudder-only R/C.

KADETT . . . 79/6

Engines 1-2 cc. Rugged all weather sports or R/C model a pleasure to build and fly.



Span 46"

for SINGLE-CHANNEL R/C for FREE FLIGHT SPORTS!

CONSUL . . . 147/-

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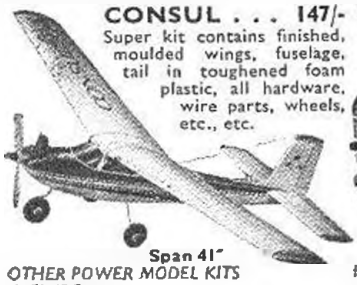

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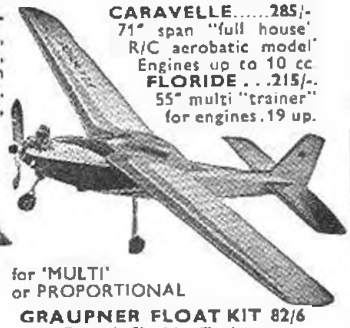

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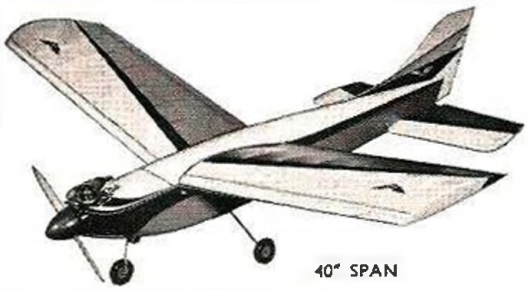

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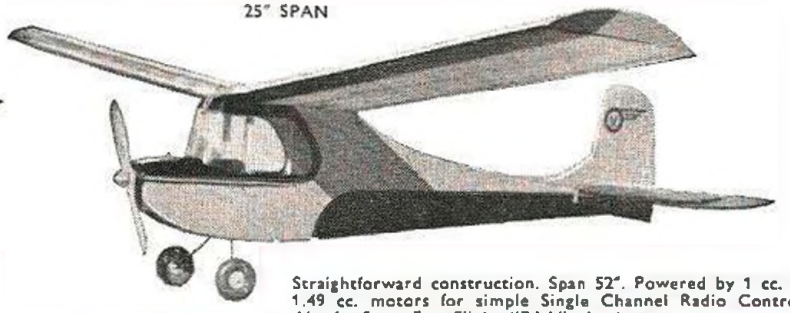

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