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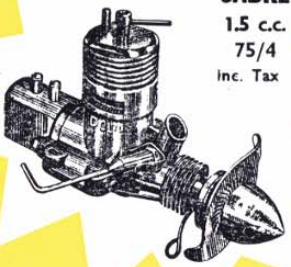

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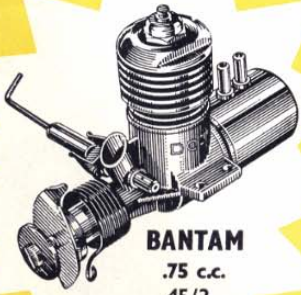

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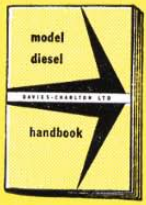

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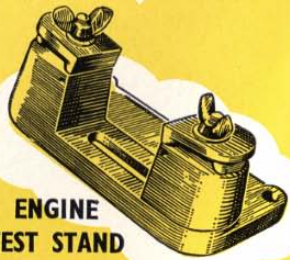

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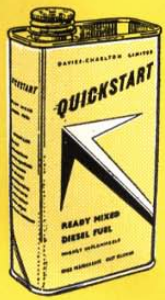

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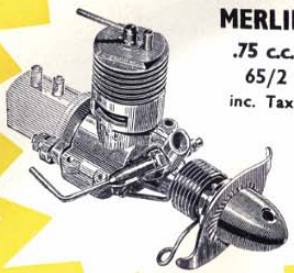

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October 1966 VOLUME XXXI No 369

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Direct subscription rate 35/- per annum including December edition and Index. These orders should be addressed to Argus Press Ltd., 23/37 Tudor Street, London, E.C.4. AEROMODELLER incorporates the MODEL AEROPLANE CONSTRUCTOR and MODEL AIRCRAFT and is published on the third Friday of each month prior to date of publication by:-

MODEL AERONAUTICAL PRESS LTD.
13-35 Bridge Street, Hemel Hempstead, Herts
Tel.: Hemel Hempstead 2501 (Mon.-Fri.)

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Advertisement Manager **LIONEL HARRIS**

COMMENT

A long established reader recently moved to a part of the country which was completely strange to him. Once domestically established, he endeavoured to seek out the local model clubs and a suitable flying site so that he might continue his enthusiasm for aeromodelling in the company of his new neighbours. To his surprise, no one knew of a local club and the recommendations he received for a flying field were far from suitable. So he wrote to us. We have a club register which is maintained up to date according to each submitted notification of a change. But this does not provide the complete answer. We are therefore planning a *National Club Survey* and urge all Club Secretaries to complete our questionnaire which is now circulated. If *you* are a Secretary and have not seen our special request—let us know *immediately*. Those that do not communicate cannot expect to be included in the survey, which is being produced as a means of expanding the club movement in Great Britain.

cover

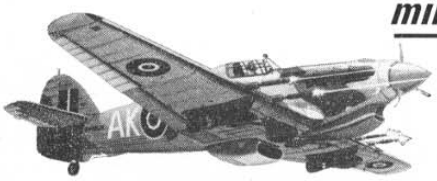
The Mikoyan/Gurevitch Mig 21 jet interceptor is rated as a formidable defensive aircraft, capable of Mach 2 and yet comparatively unsophisticated in equipment. Artist Laurie Bagley captures a "Fishbed D" (as NATO Nations know it) on afterburner plus rocket assisted take-off. *See Pages 568-570.*

next month

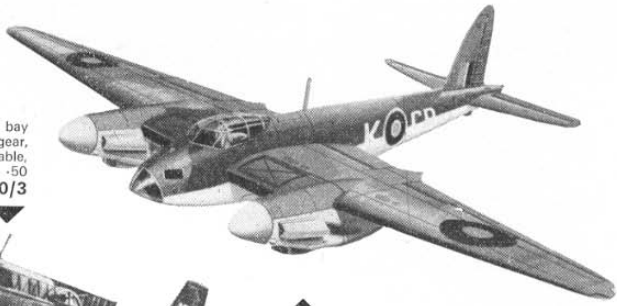
Fully illustrated report on the **World Championships** for Control-Line models at Swinderby with complete results. Plan for simple **free flight Sportster** to suit .049 (.8cc) engines and a little **all-sheet rubber driven model** that will attract all juniors. **Scale News. Latest Engines. Silencers. Victa Airtourer** scale plans and many supporting features. On sale Oct. 21.

FIGHTERS AND FIGHTER BOMBERS —famous in World War II

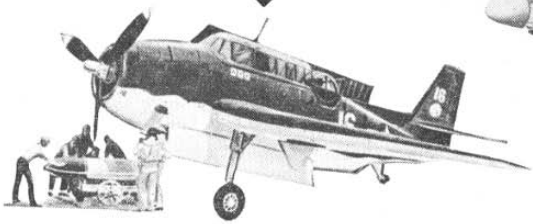
Plastic Kits for you to assemble, correct to the minutest detail, 1/48 scale



HAWKER HURRICANE — KIT PA90
Extra parts included permit making the model in several versions. Big decal sheet provides proper marking for all versions. **13/9**



U.S. NAVY
TBF AVENGER — KIT PA31
Unusual operating features: Torpedo bay doors open and torpedo drops; landing gear, tail wheel and arresting hook are retractable, wings fold, clear ball turret revolves, ·50 calibre machine gun swivels. **20/3**



DE HAVILLAND
MOSQUITO — KIT PA129
Can be built in one of four versions. Two man crew and extra tanks, bombs and rockets included. Detailed cockpit and flat-finish decal. **27/5**

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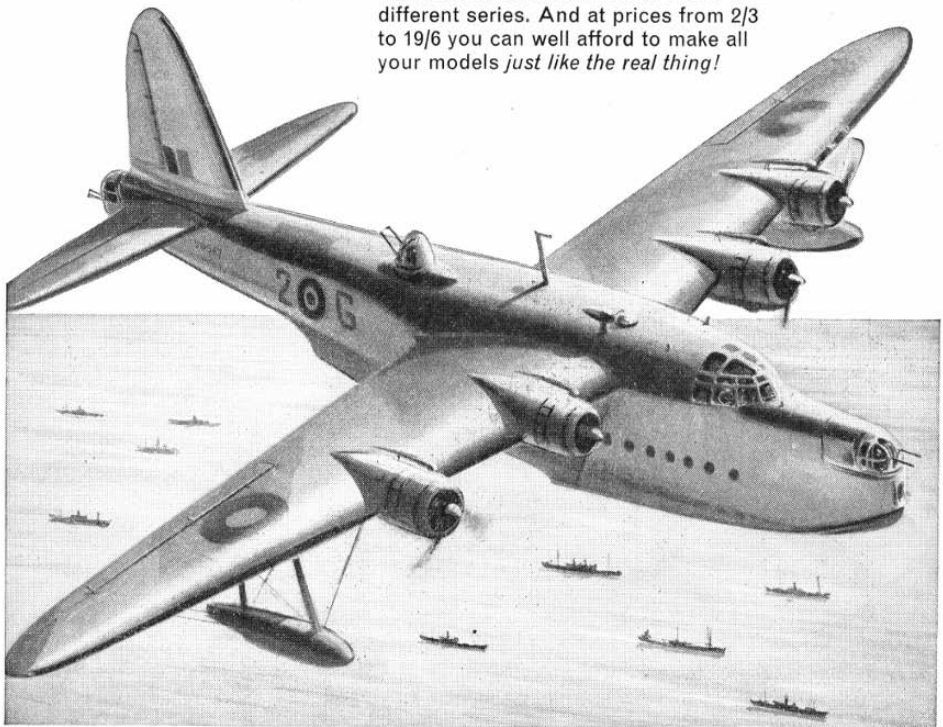

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C166

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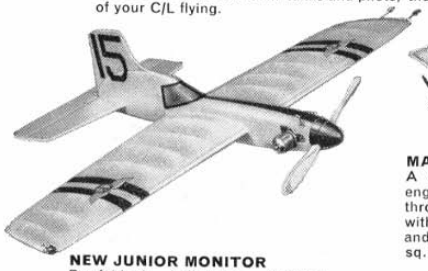
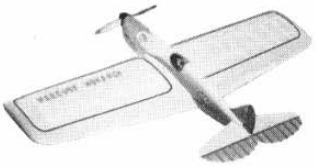


NEW JUNIOR MONITOR
Pre-fabbed hollow-log fuselage (1.5-2.5 c.c. diesels). A brilliant job The supreme fast stunt trainer. **26/2**

MARVIN
A stunt model for a 1 c.c. engine that will go "right through the book" when fitted with the A.M.10 coupled flaps and elevators, wing area 175 sq. in. **21/9**



MONARCH
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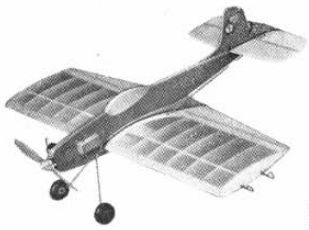
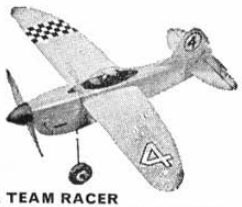
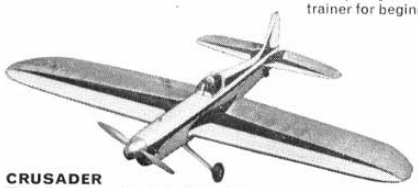
TOREADOR
Control line flying wing design with up-to-the-minute lines. Stunt aml. combat model. For diesels 2.5—3.5 c.c.s. **34/-**



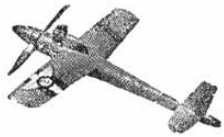


VIPER
Small version of the Cobra of similar design and performance for diesels 1-1.5 ccs or glowmotors of .09 or .15 cu. in. capacity. The ideal stunt and combat trainer for beginners. **20/-**

¼A TEAM RACER
A sturdy model that makes an Ideal Trainer for the beginner to control line flying. For diesels 1—1.5 c.c. A prefab kit costing only. **17/10**



CRUSADER
This Super prefabricated kit of a design by Bill Morley with its 630 sq. in. of wing area and coupled flaps and elevators is the most up-to-date stunt design available in kit form today although specially designed for the Merco 35 will take any good 35 stunt motor **80/-**



MIDGE
Class "A" Speed model. **8/3**

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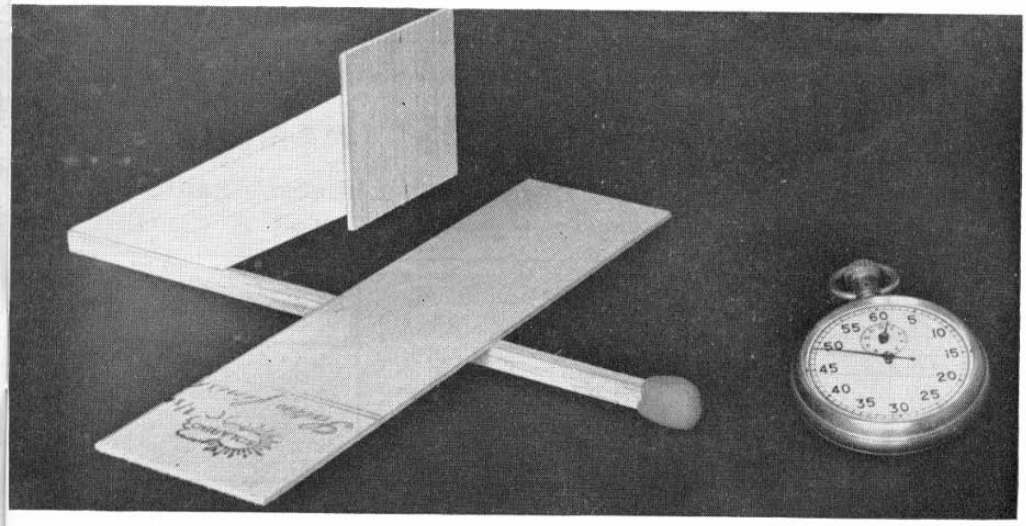
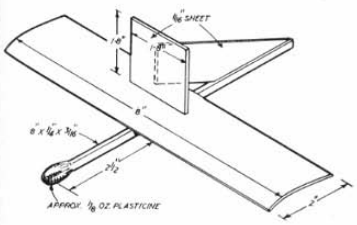


A SIMPLE "FLYING WIND TUNNEL"...



That's what they called this simple little test model devised by N. K. Walker of the Low Speed Aerodynamic Research Association some ten years ago. Of course, with that huge drag plate taking the place of a conventional tailplane it does not **fly** very well—but it does give a method of comparing the performance of various model wings without getting involved with the lift and induced drag of a tailplane. Just measure the distance travelled from a hand launch and divide by the height from which the model was launched and you have a **comparative** measure of the Lift/Drag ratio of the wing.

Try different wings, all the same size—cambered sections bent from sheet, carved sections and built-up tissue covered wings. The results can be quite informative for you are measuring the **wing performance** at model speeds. Simply trim for best performance in each case by adjusting the nose weight—and note that the balance point needs to come close behind the leading edge.

Once again, of course, it's Balsa that makes such a simple test model possible. You could not get the same results so well, or so easily, in any other material. And when it comes to Balsa your choice is automatically Solarbo Balsa if you are after consistently top quality, selected material—the sort that makes the best and strongest models and gives top performance every time. Look for the brand mark when buying, or ask for Solarbo Balsa by name.

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OS 15	118/1	R/C 151/2
OS 19	124/0	R/C 159/5
OS 29 Racing		216/5
OS 30 R/C Throttled		176/3
OS 35 Stunt Special		135/10
OS 40 R/C		176/3
OS 58 R/C		264/6

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ME Snipe R/C	87/0

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.15 R/C Throttled	113/6
.19 Standard	110/0
.19 Throttled R/C	135/0

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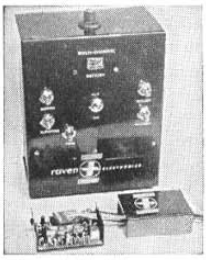

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Super 55" span R/C multi trainer for 2 to 10 channels. Engines .19 up.

CARAVELLE . . . 230/-

Larger version of the 'Floride' and fully aerobatic on 8 to 12-channel. Span 71". Wonderful de luxe kit makes an R/C model the EQUAL OF ANY IN THE WORLD. For the **SERIOUS R/C MODELLER** here are two top models. Choose the **FLORIDE** as a multi trainer or for precision flying on lightweight 'full-house' or proportional gear. Choose the **CARAVELLE** for the utmost in R/C model performance.

AMATEUR

44" span to take .8 to 1.5 cc. engines and specially designed for 2- to 6-channel radio (also single-channel). A superb example of kit prefabrication, including formers and full length die-cut fuselage sides, wing ribs, etc. Kit is wonderfully complete right down to wheels, shaped undercarts, decals, adhesives, etc.

Price £4.5.0

Radio installation is shown on a separate plan sheet.

AMIGO II

A new LARGER model—79" span—specially developed with 2- to 4-channel radio in mind (separate R/C installation plans included). Ultra-modern construction throughout, all parts prefabricated in balsa and balsa-ply. Easy, satisfying to build. A wonderful model to fly F/F or R/C!

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Pylon mount also available (16/0) for adapting to .099—.09 auxiliary power!

SCHLEICHER 'K 10'

DE LUXE KIT **132/6**

79" scale SAILPLANE FULLY FINISHED foam plastic fuselage.

This wonderfully complete kit has to be seen to be believed!

A SUPER MODEL in DE LUXE kit form specially designed for R/C and takes from 2 to 8 channels or proportional. Also adaptable as an AUXILIARY SAILPLANE with pylon mounted engine. (Pylon kit **18/6.**)

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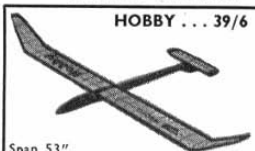
HOBBY . . . 39/6



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Popular high-performance glider for sport or contest work, towline or slope soaring.

WEIHE 50 . . . 89/6

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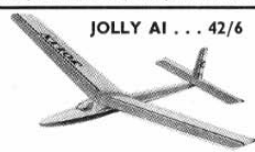
True to scale and flies like full size craft. Kit includes finished foam plastic fuselage. Ideal for R/C

JOLLY AI . . . 42/6



A new and very popular high-performance glider for sport or contest work with exceptional towline stability. For contest or sport

These three models from the Graupner range have been chosen to cover popular demand—the **HOBBY** for the highest possible performance from an 'open' contest specification . . . the **JOLLY** for the highly popular AL contest class (but just as satisfying for flying for fun) . . . and the **WEIHI** which is true scale and with a **FINISHED STREAMLINED FUSELAGE.** The **WEIHI** is also large enough for R/C.

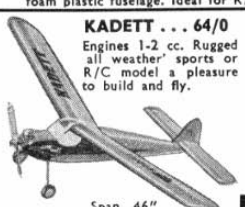
CONSUL . . . 117/6

Super kit contains finished moulded wings, fuselage, tail in toughened foam plastic, all hardware, wire parts, wheels, etc.

41" span for .09 to .15 engines and single channel or up to 6 channel lightweight multi R/C.

KADETT . . . 64/0

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



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TOPSY—F/F or R/C . . . 39/6

32" Span

Engines up to 1 cc.

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Span 44"

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Ideal for 1 to 1.5 cc. engines

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MARINE AIRCRAFT OF THE 1914-1918 WAR

TO BE PUBLISHED ON OCTOBER 8th, 1966 BY

HARLEYFORD

THIS IS THE MOST DETAILED STUDY OF FLOAT PLANES, FLYING BOATS, SHIPBORNE AIRCRAFT AND NAVAL AIRSHIPS AND BLIMPS TO BE COMPILED

FOLLOWING publication of our title *Fighter Aircraft of the* 1914-1918 *War,* so popular that already over 15,000 copies have been sold—which we followed with a companion title, *Reconnaissance and Bomber Aircraft of the* 1914-1918 *War*—we now have pleasure in announcing a third book, *Marine Aircraft of the* 1914-1918 *War,* which together with the other two makes complete for the air historian, enthusiast and model builder the best record available on all aircraft flown by the various nations engaged in the 1914-1918 War.

This book, produced IN ENGLAND, to the usual Harleyford high standard both in quality of printing and binding, covers in the widest possible sense the meaning of the word MARINE. Not only seaplanes, i.e. flyingboats and float planes, but shipborne aircraft with wheeled, skids or jettisonable undercarriages, and the land- or carrier-based torpedo-carriers, are all included. Attention is also given to the German Naval Zeppelins and the airships, blimps and balloons of the Allies.

"Marine Aircraft of the 1914-1918 War" is printed and bound by a leading English Printer, to HARLEYFORD'S usual high standards—First quality paper, bound in real cloth on heavyweight millboard. Size 8¾ in. wide by 11¼ in. deep, weight is approximately 2½ lbs.

Apart from the individual histories of all the various marine aircraft types, the development and organisation of the naval air service of each of the nations is reviewed so as to set the scene both in aeronautical and naval history.

Britain, at the time—1914-1918—was the world's greatest sea power whose supremacy was challenged on the surface in 1916 at the Battle of Jutland, the first great naval battle in which a sea plane was involved. The next year, when Germany proclaimed unrestricted submarine warfare, Britain was within a few weeks of starvation. This underwater menace was combated in no small degree by intensive patrolling of coastal waters by seaplanes and in particular by flyingboats through Anglo-American co-operation. Germany, at first using seaplanes for naval reconnaissance, built fighter floatplanes to combat Allied flying boats over the North Sea and so by stroke and counter-stroke the air became of importance in naval affairs.

The United States is now the world's greatest sea power and the origins of their great naval air power are vested in the 1914-1918 War when Americans learned at first hand, initially by sending U.S. Navy officers and men to serve with the Allies and then by bringing their own forces into the conflict.

This war saw the origins of the aircraft carrier and the development of the torpedo-bomber among many other innovations of great importance to both aeronautical and naval history. Thus, this is not only a book for all interested in aircraft, but a book that will interest also those 'who go down to the sea in ships' or have an interest in the naval heritage of their respective countries. Many of the early builders of flying boat hulls of both the Allies and the enemy were ship-building firms, and formations and units of marine aircraft were an integral part of each country's Navy.

Many experimental types were developed during the war, some that never rose from the water or crashed on their first flight; types designed to fly from lakes in Russia or in the African continent, or to fly from platforms erected on ships or merely lifted by crane from ship to water. All these diverse types are covered for each nation. These, with the standard service types, illustrated with their variants, provide a unique collection of photographs, many of which have never before been published.

Also, much text information never before published has been compiled, written up and edited by experts, all of whom are internationally known as authoritative writers.

This book is a revelation in text as well as in photographs. The acme of perfection and completeness in this work on marine aviation is met by the fifty-six 1/72nd scale drawings of all the major types, many of them so large as to require two pages to maintain the standard scale so useful to modellers. As with previous titles, artist 'Doug' Carrick was commissioned to paint an incident representing this period, and it appears in full colour on the dust cover and as a frontispiece.

Altogether this book contains approximately 227 pages, approximately 500 photographs, 1 colour plate, and fifty-six 1/72 scale 3-view drawings, each with a wing section and 3 fuselage sections.

Compiled and Written by **HEINZ J. NOWARRA**
Text of British Section by **BRUCE ROBERTSON** *and* **PETER G. COOKSLEY**
Line Tracings by **W. F. HEPWORTH,** *M.S.I.A.*
Based on Original Drawings by **H. LÖBNER** *ann* **PETER G. COOKSLEY**
Produced by **D. A. RUSSELL,** *M.I.Mech.E., and* **R. DOCK**

THE UNDERNOTED FIFTY-SIX AIRCRAFT ARE ILLUSTRATED WITH 1/72nd SCALE THREE-VIEW DRAWINGS. THOSE MARKED WITH AN ASTERISK OCCUPY DOUBLE PAGES.

AUSTRO-HUNGARIAN	
*LÖHNER	L
*OEFFAG	K
PHÖNIX	A
BRITISH	
*A D FLYING BOAT	
BEARDMORE	WB III
*FAIRY	III C
*FAIRY CAMPANIA	F 22
*FELIXSTOWE	F 3
NORMAN THOMPSON	NT2B
PORT VICTORIA	PV2 bis
*SHORT	184
*SHORT	166
*SHORT	320
SOPWITH CUCKOO	
SOPWITH	807
*WIGHT CONVERTED SEAPLANE	
FRENCH	
DONNET DENHAUT	2
F.B.A. LEVÊQUE	
F.B.A.	H
F.B.A.	S
*G. LEVY	HB 2
*TELLIER	200 PS
*TELLIER	350 PS
GERMAN	
ALBATROS	W I
DORNIER	CS I
FRIEDRICHSHAFEN	FF 31
FRIEDRICHSHAFEN	FF 33 E
FRIEDRICHSHAFEN	FF 33 H
FRIEDRICHSHAFEN	FF 33 L
FRIEDRICHSHAFEN	FF 39
FRIEDRICHSHAFEN	FF 43
*FRIEDRICHSHAFEN	FF 49 C
GOTHA	WD 7
GOTHA	WD 13
*GOTHA	WD 14
GOTHA	WD 15
LÜBECK TRAVEMUNDE	EF 2
*RUMPLER	4B II
SABLATNIG	SF 2
SABLATNIG	SF 4
SABLATNIG	SF 5
*HANSA BRANDENBURG	FB
HANSA BRANDENBURG	NW
HANSA BRANDENBURG	W 2.
ITALIAN	
*CAPRONI	Ca 47
MACCHI	L 3
*MACCHI	M 7
*MACCHI	M 8
*MACCHI	M 9
RUSSIAN	
GRIGOROVITCH	M 9
U.S.A.	
CURTISS	F
CURTISS	MF
*CURTISS	HS IL
*CURTISS	HS 2L
*CURTISS	H 4
*CURTISS	H 12

MODEL AVIATION '66 the exhibition organised by S.M.A.E. Assistant Public Relations Officer Mrs. Freda Shirt with the Lincoln City Library authorities was a fine preliminary show to awaken local interest in the subject. Local dignitaries, Group Captain B. Hamilton OBE DFC AFC, Officer Commanding RAF Swinderby, and three members of the British Team for the World Championships were among those present at the opening.

The two week show attracted good press reports and daily attendance averaged 1,000. Exhibits included photographic displays of beginners models under construction to use of balsa wood, vintage and veteran engines, modelling literature and of course displays of models. With such a massive effort it is to be hoped that the Lincoln Club will soon reap the benefit with more recruits.

ATV FILM feature on John Simmance and his models is due for a showng one Monday in the September—October period. Scan the programmes if you don't want to miss what should be a very interesting half hour interview of a Champion about his hobby.

AFRICAN TV feature "TV-Zambia Wings Club" proceeds apace, having another flying meeting in June when, believe it or not, the weather conditions turned sour and the winds blew unusually hard. As organiser Don Sweetenham reports—"even the demonstrated R/C models were taken home in kit form." Sheltered areas allowed control line activity where Zambian National Champion Stunt flier Al Sutherland and others were on hand to teach the novices the tricks of the trade. Intriguing sidelight to us is the provision of "Curry and rice and bar facilities"—sounds like a new idea for that club picnic!

NEW PLASTICS with entirely new techniques in finish, are soon to come from the U.S.A. The idea is to provide the most realistic representation of fabric. When moulded by the usual injection system, moulds for plastic model wings have to receive very special treatment to achieve anywhere near the desired result. Messrs. Inpact have done wonders with the surface effect on their "Mag. Men" Models. In France models of the same era, the Bleriot XI, the Vosin etc., appeared a few years ago with framework and a flimsy covering paper. The result was not quite as it should be, although an approach in the right direction. At least one could get rib sag effect even if it did still look like nothing more than a tissue covered plastic frame. The idea was taken further by Renwal in the U.S.A. for old-time models. Now they take the idea to a far more useful stage. A series of six World War One fighters, 5 biplanes and a Sopwith Triplane are to be issued to 1/72nd scale. Kits are "solid" for the fuselage, etc., but "skeletal" for wings and tail. In the kit, which is of a specific aircraft as flown by a particular Ace in each case, a sheet of *printed* lightweight tissue offers covering in the camouflage, or bright decorative scheme that applies. The colours range through the Air Forces of Great Britain, France U.S.A. and Germany. The tissue is applied by special adhesive supplied in the kit which also shrinks the covering over the ribs, etc. Techniques will inevitably be "different" but so too will the end result be another move towards more realism, obtained with a minimum of effort. We hope to review the models in an early issue.

DEMON TELEPHONE which plagues our editorial day, often has its lighter moments. Why—for example should the Royal Society for the Prevention of Accidents be enquiring the average range of a commercial radio control outfit? Why indeed! Then there was the call from the U.S.A. The operator asked if we'd hold on—and sure enough it *was* the U.S.A., a caller from California asking if he still stood a chance in replying to one of our classifieds. Of course the longest call in terms of distance in recent weeks was that by Australian Brian Horrocks, our Aussie Nats correspondent, and the luckiest was possibly that by Franco Marcenaro, of Genoa, who caught us at 6.45 one evening to enquire about the World Championships. Increasingly common is the call to enquire can we do this or that plan—they think it was

Up the pole ? Not a model but a very real French Nord Norecrin perched on a post in Vienna's car scrapyard known as the "Auto-Metzker". It is on the main road from Vienna to Styria. A D.H. Rapide can also be seen. The Norecrin came from the Vienna Flying School at Aspern.

Views of the "Model Aviation '66" exhibition held at Lincoln City Library as a preliminary for the World Championships. Display arranged by Mrs. Freda Shirt attracted thousands of visitors, and will be used in other exhibitions.

published about 1939-1947 period and it was most probably in *Aero Modeller*. The swing to the reminiscent vintage type by modellers returning to the fold with second wind is quite obviously "on".

For them, we offer a list of plans which are not included in our new catalogue (Price 2s.) but which can be printed to order at a few days delay over normal service. Known as the "X" list, we'll send it by return of post to anyone supplying stamped (4d.) self addressed envelope.

BRITISH PARTICIPATION in the 1966 World Championships for Indoor models at Debrecen, Hungary was sufficiently notable for its absence to be commented upon by the organisers and others present. Simple reasons for the fact that we were not there are; (a) lack of interest in the subject despite the availability of the World's finest Indoor flying site at RAF Cardington; (b) cost of the operation to the individual participants. Whilst in some recent cases, the SMAE has been able to afford to pay entry fees for Championships Teams, the fares remain the responsibility of the people concerned. This may change, depending on the success of the efforts of the Control-line enthusiasts and SMAE Council officers at the recent C/L World Champs.

NEWS ITEM at breakfast time on the B.B.C. August 18th concerned one Karl Webster of Princes Street, Rochester, who complained to authorities that his 1 lb. "balsa wood glider" had been smashed in the air by two jet planes. Who was too high—or too low?

Karl Webster's own story of what happened is that, "after a D/T failure the glider climbed to about 500 ft. but as there was no wind did not drift out of the field boundary. I simply lay on my back and watched it getting higher. Two low flying Starfighters appeared from the North West and crossed overhead, one of them hitting the model. Both of them carried on to the South East as if nothing had happened and left me watching a cloud of balsa and tissue fluttering about in the thermal (the nose block and front end of the fuselage were picked up from an orchard near-by).

"I can only guess that the Jet hit the soft parts of the model as I dread to think what a five ounce solid lead nose-block would have done. All this goes to show that insurance cover does not go amiss even for the humble A/2."

WORLD CHAMPS '66

RESULTS

TEAM RACE

1	Stockton/Jehlik (U.S.A.)	4:25	9:22
2	Hohenberg/Turk (Austria)	4:33	9:23
3	Shapovalov/Radchenko (U.S.S.R.)	4:25	10:35
4	Gurtler/Klem (Czech)		4:36
5	Turner/Hughes **(G. Britain)**		4:42
6	Sundell/Sundell (Finland)		4:43
7	Trnka/Drazek (Czech)		4:45
8	Lutkat/Lutkat (W. Germany)		4:46
9	Gombocz/Toth (Hungary)		4:48
10	Fontana/Amodio (Italy)		4:49

TEAM

1	CZECHOSLOVAKIA	14:25
2	U.S.A.	14:33
3	HUNGARY	14:42

AEROBATICS

1	J. Gabris (Czech)	6013
2	J. Silhavey (U.S.A.)	5882
3	L. McFarland (U.S.A.)	5878
4	S. Wooley (U.S.A.)	5713
5	J. Kari (Finland)	5588
6	L. V de Hout (Holland)	5556
7	W. Bagalini (Italy)	5467
8	Y. Sirotkin (U.S.S.R.)	5409
9	O. Andersson (Sweden)	5339
10	M. Vanderbeke (Belgium	5296

TEAM

1	U.S.A.	17473
2	CZECHOSLOVAKIA	16221
3	ITALY	15597

SPEED

1	W. Wisniewski (U.S.A.)	258.99 km/h
2	R. Theobald (U.S.A.)	241.61 km/h
3	C. Schuette (U.S.A.)	226.42 km/h
4	J. Sladky (Czech)	225 km/h
5	F. Zilleken (W. Germany)	225 km/h
6	Z. Pech (Czech)	223.6 km/h
7	A. Malik (W. Germany)	222.22 km/h
8	G. Krizsma (Hungary)	220.86 km/h
9	A. Lapinin (U.S.S.R.)	220.86 km/h
10	R. Miebach (W. Germany)	219.51 km/h
11	K. Lindsoy **(G. Britain)**	218.18 km/h

TEAM

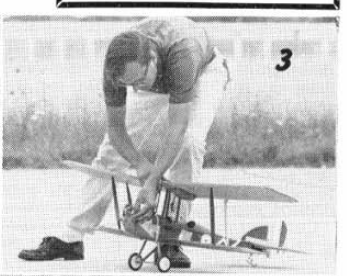
1	U.S.A.	727.02
2	W. GERMANY	666.73
3	CZECHOSLOVAKIA	660.36
4	**G. BRITAIN**	641.73

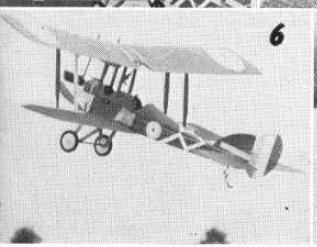
SCALE

1	W. MacZura (U.S.A.)	*Bearcat*
2	A. Day **(Gt. Britain)**	*Shinn*
3	R. Ivans **(Gt. Britain)**	*Potez 63*

Full details and results next month

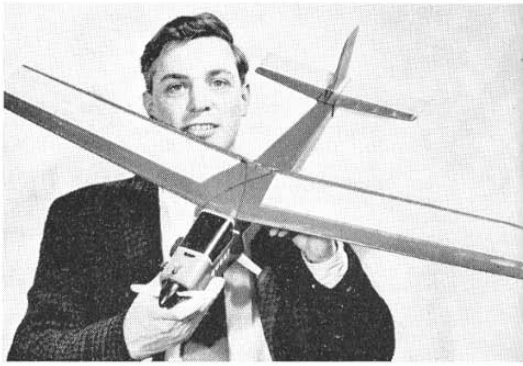
I'll get this darned 'ol Fox 15 running if its the last thing . . . says Frank Gattolin, seen at the U.S. Nats with BE 2e from Aeromodeller Plans. Pic 2 is the inquest —was it plug, or fuel ? Easy does it in 3, just a tweak on the needle and we're away. Hold it straight into wind (4), leggo in 5 and off she climbs in 6. Cripes ! ! we forgot the pilots !





David Boddington's QUEST

35½ ins. Span Single Channel Radio design for ·5-·8cc.



TRY to organise a building schedule before you start this project, and keep to the programme, don't start on all the interesting parts and leave the dull items until last. Cut out all your sheet parts before commencing building and build the wings and tailplane first. You should find construction straightforward with no particularly difficult parts. Choose the balsa wood carefully for lightness and eveness, especially the fuselage sides.

Wings are constructed in two sections and joined together with dihedral braces. After soaping the drawing, pin down a piece of ¼ in. x 3/32 in. trailing edge. Cut ⅛ in. square hard lower spars to length and pin in postion. Cut wing ribs by the blocking method, afterwards cutting the root ribs due to the narrow spacing of this rib. Glue 3/32 in. and 1/16 in. wing ribs in position shown and check that all are vertical except for the root rib, which should be angled from the root rib template. Glue the top spar in position. Fix the top trailing edge in position and glue the leading edge in position. When dry remove from the plan and sheet in the upper surface of the wing from the rear of the top spar to the leading edge and from root rib to the tip. Add ¼ in. soft balsa tips and sand paper, together with the leading edge to smooth contour. Construct the second panel in a similar manner.

When both panels are set cut slots in the first three ribs to receive the dihedral braces. Check these for accurate fit and then glue into position on one wing panel. When dry add the second wing panel to the projecting dihedral braces, glue thoroughly and pin down, prop up the opposite wing tip to 2¾ in. to obtain the correct dihedral angle. Hold firmly in position until dry, pinning the two root ribs together. Sand and prepare for covering and glue trailing edge stock reinforcement. Cut ailerons from hard 1/16 in. quarter-grain sheet and sand and prepare for painting. Ailerons should be sewn to the wings after all parts have been covered, doped, and fuel proofed.

Construct the basic tailplane frame from ⅛ in. x ⅛ in. strips ⅛ x ½ in. T.E. stock as shown on plan remembering to prop up T.E. to allow for symmetrical section. When dry, remove from plan and add ⅛ in. square to rib position and ⅛ in. sheet to centre section on aerofoil section.

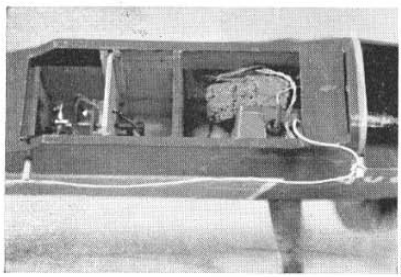
Fin and Rudder is straightforward construction of 3/32 in. sheet sanded to slightly tapering T.E. and rounded L.E. A trim tab may be fitted if desired.

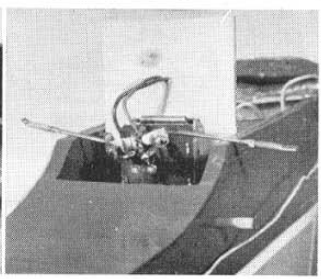
Mark on the sanded fuselage sides, the positions of formers and strengthening longerons and uprights. Glue the ⅛ in. sq. and 3/16 in. x ⅛ in. longerons and uprights and ⅛ in. x ⅛ in. top and bottom doublers in position. When the sides are dry glue the formers F.2, 3, 4 & 5 in position ensuring that they are square with the sides. Add the ¼ in. soft balsa sheet to the lower and upper nose area. Glue internally to the battery compartment to the rear of F.2, the ⅛ in. bottom sheet and the side framework, ⅛ in. sheet latex or synthetic rubber sheet to act as shock absorption for the DEAC cells. Note: Plastic foam is not sufficiently resilient for lining purposes but ideal for holding the batteries loosely in position within the battery compartment. Add top ⅛ in. plywood nose block. Draw in the fuselage ends and glue in position formers F.6, and the tailblock with 1 mm. ply plate end, and ⅛ in. sq. cross members. When all is set top and bottom 1/16 in. and 3/32 in. sheeting can be added, including the 1/16 in. ply for the main undercarriage and the 16 gauge piano wire tail skid bound to 1/16 in. ply if a conventional two wheel u/c is to be fitted.

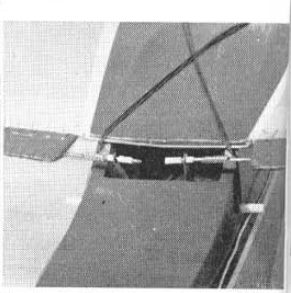
Covering and Finish. The model should be covered in lightweight nylon or heavyweight tissue. Pin down all flying surfaces when doping to prevent warps. Colour dope should be kept to minimum as this represents wasted weight but the model should be thoroughly fuel proofed to avoid seepage of fuel into the structure, particularly beneath the engine.

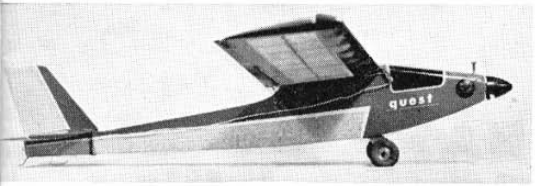
Escapement Installation. The escapement is mounted on a 1/16 in. ply former in the normal way with ⅛ in. sq. guides to slide the escapement in and

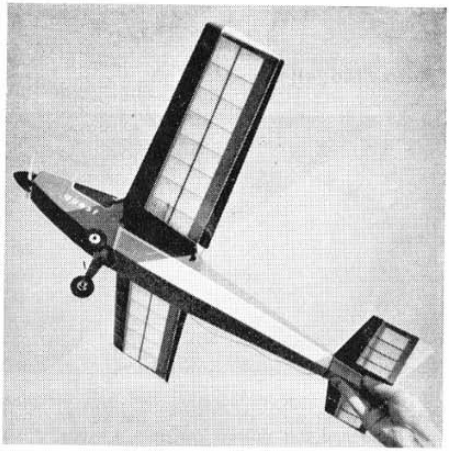
Left: the Radio compartment is roomy, receiver fits sideways in forward section. Conquest escapement on sliding ply former at rear. Centre, Escapement mounted to actuate ailerons as sketched on plan with ply former raised for inspection, at right it is in position with links engaged on aileron extension rods.











Quest is sleek and purposeful indeed in size for local sports flying and spot landing events. This one has aileron controls, plans show the alternative rudder controls for conservative fliers.

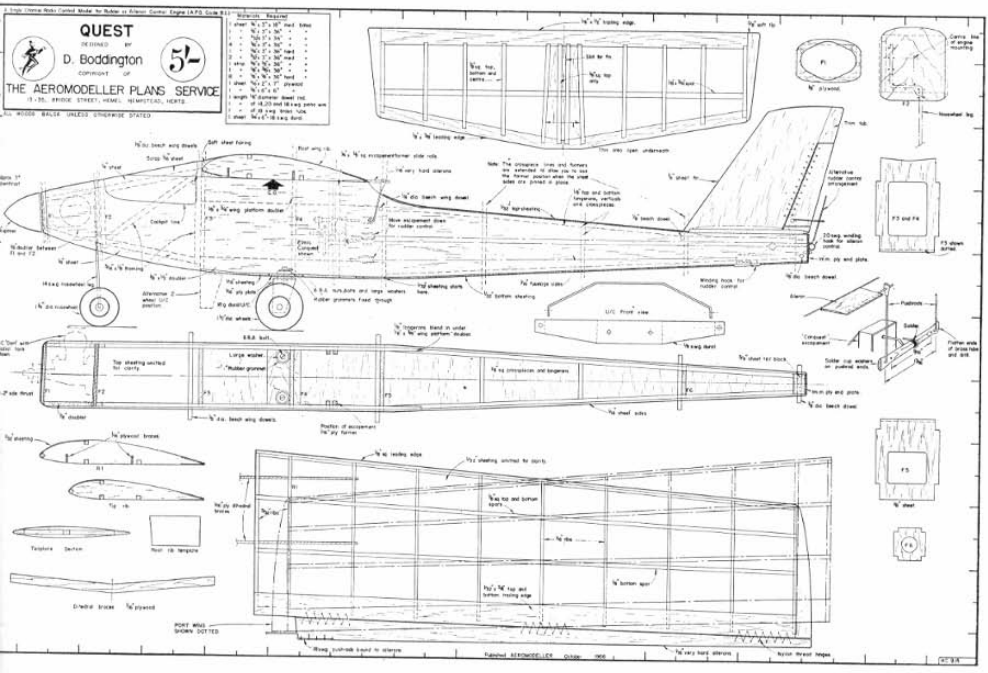
out. Cut a piece of 12 or 14 g. brass tubing $1\frac{1}{16}$ in. long and flatten the ends in a vice. Drill two holes each side approximately $\frac{9}{16}$ in. and $\frac{13}{16}$ in. from centre to centre. Solder this rocker arm onto the drive hook of the escapement. With the wings in position cut two 18 s.w.g. piano wire pushrods to length, bend one at 90 deg. and solder to the rocker arm with cup washers. Cut small lengths of 16 g. tubing, flatten the ends and drill to receive 18 g. aileron horns, and solder then to the pushrod arms so that the ailerons are level. Test for linkage freedom of movement. The amount of "throw" will depend on which hole on the rocker arm is used.

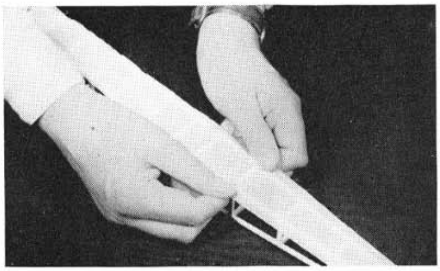
Radio Installation due to the variety of radio control equipment presently available, no specific instructions are given for installation, but the use of DEACs is strongly recommended for the reasons of nose weight and reliability.

Test Flying. Check the functioning of the radio gear and check again, now wait for right weather conditions. If you are sure there are no warps, and that the C. of G. is correctly located then test glide in the most suitable area you can find, the launch should be fast and straight. Correct any turn with opposite rudder and dive or climb by adjusting tailplane incidences 1/64 in. at a time. When the glide appears O.K. test with engine running and radio on, have the engine running at near full power and get somebody to launch for you. If power stalling occurs adjust with downthrust on the engine, i.e. washers between engine top bolts and bulkhead, note turn under power and if this is the same on the glide adjust with rudder, if under power only adjust with opposite side thrust.

Remember, ailerons can take a little longer to become effective than rudder so try to anticipate signals and stop transmitting in good time too. The prototype has also been flown as a rudder only model but in this case it is suggested that the dihedral is increased to $1\frac{1}{8}$ in. under each wing tip.

FULL SIZE COPIES OF THIS 1/5th SCALE REPRODUCTION ARE AVAILABLE FROM AEROMODELLER PLANS SERVICE PRICE 5/6d. incl. POST. QUOTE PLAN RC 915 WHEN ORDERING.





BASIC Aeromodelling

PART SEVEN (concluded)

Covering materials

The wide range of covering materials described last month all need attaching to the airframe with adhesives and this process can ruin a model if not done correctly, so read on for the correct methods.

A variety of adhesives can be used—see *Table* XXV—and choice is usually a matter of individual preference. Some people find it easier to use a tissue paste rather than a tissue cement. Both are quite 'sticky' adhesives and easy to use, but paste is slower drying and gives more time for working. Paste, however, is a' wetter' adhesive and if over-generously applied can cause damage to tissue which is not wet-strengthened when it is being pulled tight. Another thing with paste is that excess paste trapped under the covering between, say, the end of a rib and the leading edge will dry into a hard lump and fall free. It will then rattle about inside the covered wing.

Paste is definitely *not* suitable for attaching covering to the underside of undercambered wing ribs. Tissue cement or dope *must* be used for this job. Covering attached with paste will pull away from the rib when the covering is tautened—not necessarily from every rib, but enough to spoil the covering job.

Using dope as an adhesive for attaching the covering results in the cleanest and neatest job, but is far more tricky to use. The technique here is to dope the framework to which the covering is to be attached and allow to dry. Sand lightly to smooth out any raised grain and dope again. When surface dry, lay the covering in place and brush thinners through the covering to soften the dope again and make it stick to the covering. For heavier covering materials and large models use thick dope. For smaller models and thinner coverings use thinner dope. First attempts with this technique are usually frustrating, since the covering is often reluctant to remain stuck down and the process is a slow one. Use tissue paste or tissue cement until you have mastered covering technique—then try dope as an adhesive for cleaner results. You will either like the method, or go back to paste or cement adhesives.

Each face of the fuselage is then covered separately. Apply adhesive to the longerons at about the centre of the fuselage over a distance about four or five inches, lay the tissue in place smoothing down over the pasted areas with a finger, and pull reasonably taut. Now work along to the front in similar four or five inch stages—pasting the longerons, smoothing the tissue in place and pulling taut. Go back to the centre and proceed to complete,

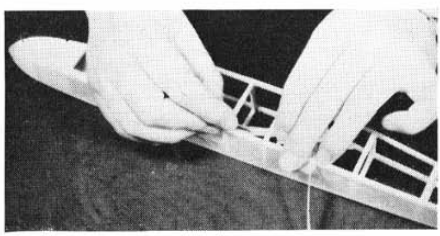
TABLE XXV
ADHESIVES FOR COVERING

	Photographic paste, Office paste e.g. Boundfix & Gripfix	Tissue Paste	Tissue Cement	Clear Dope	Evostick	Rubber Cements
Tissue Wing (General)	●	●	●	●	□	□
Silk or Nylon (General)	●	●	●	●		□
Undercambered Wings			□	●		□
Sheet Balsa Surfaces	●	●	□	●		□
Polyester Film					●*	
Metallised Papers	□	□	□		□	●
Stuck on paper						
Trim or labels			●	●	□	□

□Suitable ●Recommended or standard
*Thinned down with ether or chloroform

TABLE XXVII
ESTIMATING AREAS OF COVERING MATERIALS

For typical model proportions approximate covering areas can be estimated as follows:—
WINGS=2 × wing area
FUSELAGE=2 × wing area
TAILPLANE plus *FIN*=wing area
TOTAL=5 × wing area
Example: for a model of conventional layout with a wing area of 440 sq. in. the approximate *total* surface area (i.e. total area of covering) will be 5 × 440=2200 sq. in. Covering weight can then be estimated accordingly.



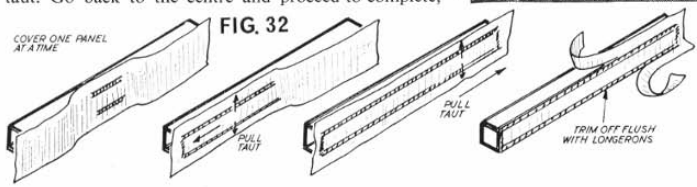
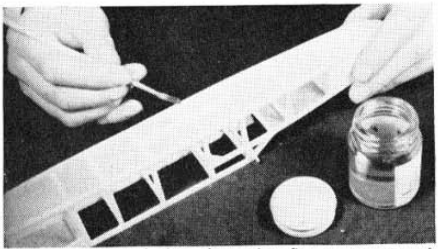


FIG. 32

Heading picture above shows one side of fuselage being tissue covered pull wrinkle free and tight. Above: trim raeged edges off with sharp razor blade, keep blade free from paste, or tissue will tear.



With fuselage covered, dope tissue edges first to prevent weak points pulling away as they shrink through dope drying.

attaching the covering to the rear in a similar manner. It is more important to apply the covering smoothly without wrinkles than it is to pull it *tight*. It can be tautened up later.

Stages in covering a typical 'box' fuselage are shown in *Figs 31 & 32*. Starting point is to cut four panels of tissue, one for each 'face' to be covered, each panel at least one inch oversize all round. Most tissues have a grain and the panels should be cut so that the grain runs across the width of the panel, i.e. from longeron to longeron.

Surplus tissue can then be trimmed off flush with each edge, using a new razor blade. It is important to use a really sharp blade as otherwise the tissue will tend to tear. This soon happens with a new blade as the edge gets clogged with adhesive. If using paste as the adhesive, dip the blade in water from time to time and shake dry. This will help keep the edge keen.

Having completed covering of one side, the remaining sides can be covered in turn in a similar manner, and it does not really matter in what order. There are, however, variations you might prefer. Thus when using coloured tissue, many modellers prefer to cover the two sides (or top and bottom) first and trim off the tissue with a slight overlap—*Fig. 33*. This is then pasted down around the longeron so that when the remaining tissue panels are applied there is no possibility of a gap of bare wood showing. The final panels can also be trimmed off over size and pasted down, or trimmed off flush. The latter method is rather neater.

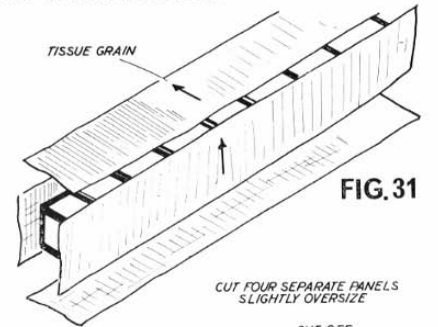


FIG. 31

FIG. 33

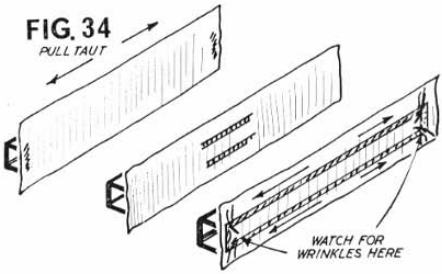


FIG. 34

An alternative method of applying the panel is shown in *Fig. 34*. After fixing at the centre, the covering is drawn taut lengthwise and pasted down to each end. The job is then completed by working along the lengths of longeron from the centre outwards. This method makes it somewhat easier to ensure reasonable tightness from end to end but is more likely to produce wrinkles at the extreme ends. It may even be necessary to pull the covering off and reposition to clear these.

Multi-sided fuselages are tackled in a similar manner except that each 'face' has to be covered by a separate panel of tissue—*Fig. 35*. The question of making neat joins between panels also arises. The technique of applying the

TABLE XXVI
TYPICAL COVERING WEIGHTS

Covering	Weight—ounces per 100 sq. in. — Covering only	Plus 1 Coat Clear Dope	Plus 2 Coats Clear Dope	Plus 3 Coats Clear Dope ++	Plus 4 Coats Clear Dope ++
Jap Tissue Lightweight	.028	.0315	.0340	.0375	.0410
Modelspan Heavyweight	.0265	.0382	.0530	.670	.0820
Modelspan	.055	.070	.089	.104	.125
Silk	.05-.02	*	*	*	*
Nylon	.15-.25	*	*	*	*
Polyester Film (1 thin)	.07-.10	†	†	†	†

‡ Or equivalents, e.g. 2 (or 3) coats, or clear dope plus 1 coat of fuel proofer
†No finishing required
*Increase in weight with dope coatings depends entirely on the porosity of the original material governing the number of coats of clear dope needed to fill; plus weight of finishing dopes, etc. which will vary with colour and type.

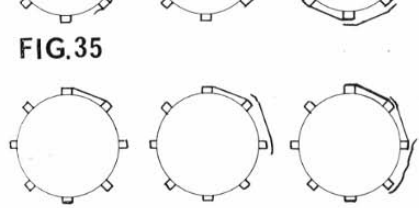


FIG. 35

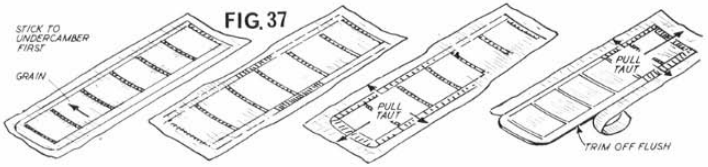


FIG. 37

When covering the underside of a wing make sure tissue grain runs from leading to trailing edge. Pull wrinkles out prior to doping in both spanwise and chordwise directions.

panels progressively around the fuselage enables one edge of each panel to be trimmed flush. Covering alternate panels enables both edges of these panels to be trimmed flush, but both edges of the intermediate panels have to be pulled back, trimmed close and pasted down. The former method is normally the neatest.

For covering wings, a separate panel of tissue is required for each 'straight' section of the wing, top and bottom—*Fig 36*. Covering cannot be carried past a dihedral break, even on the underside, without wrinkling appearing. Tissue panels are cut oversize again and with the grain running from leading edge to trailing edge.

Stages in covering a single wing panel are shown in *Fig. 37*. Normally the underside is covered first, and in the case of undercambered ribs, stuck down to *each* rib first, keeping reasonably taut from root to tip and making sure that no wrinkles appear between the ribs. Covering is then completed by pasting down to the edges, starting at the centre and working to each end in turn. Then trim off surplus material.

Covering the upper surface is just like tackling a fuselage side, pasting down to leading and trailing edges first at the centre and then working to each end. It needs a little more care to avoid wrinkles, however, because of the curvature involved. Also avoid trying to pull the covering too tight as this could warp the wing structure. Also, once started, go on to complete covering the whole wing. Do not leave with the wing only partly covered as again this can produce warping.

Tips may need special treatment since the top covering may not pull out of the compound curve involved without wrinkling. The simplest method is to terminate the top covering on the end rib and cover the tip with a separate piece—*Fig. 38*. In some cases slitting the covering along the line of the end rib may enable it to be re-adjusted to complete covering with the top panel, pasting the overlap down over the end rib.

Tailplanes and built-up fins are covered in a similar manner to wing panels, only in this case each 'face' can usually be covered by a single panel of tissue, attaching to the outline only. Where a wing or tail (or a fuselage) involves sheet covered areas, the tissue must be pasted down all over the sheeting. If attached to edges only it will almost certainly wrinkle when water sprayed to tauten.

Covering sheeted areas can be tricky when using paste or tissue cement. Paste tends to wet the tissue and cause it to expand, making it difficult to apply the covering evenly. It will also weaken tissue which is not 'wet-strengthened', so that tears may appear in smoothing and pulling the tissue in place. Tissue cement has the disadvantage of drying rather too quickly for easy attachment of tissue covering to large areas of sheeting, so that the tissue ends up by not being stuck down all over. Dope is a better adhesive in such cases.

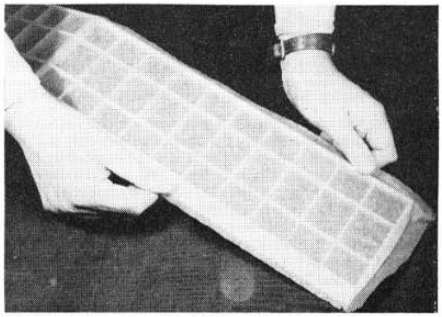


TABLE XXVIII
PROPERTIES OF POLYESTER FILMS

Gauge	Thickness inches*	WEIGHT* oz. per sq. ft.	WEIGHT* oz. per sq. in.	Tensile strength per inch width
25	.00025	.025	.018	6.25 lb.
35	.00035	.035	.025	8.75 lb.
50	.0005	.05	.035	12.5 lb.
100	.001	.1	.07	25 lb.
150	.0015	.15	.105	37.5 lb.
200	.002	.2	.14	50 lb.

*These figures apply to plain film. The latest materials of this type developed for covering incorporate a colour coating plus a self-adhesive film. Thickness is substantially the same but weight is increased.
Note also that weight represents *total* weight of covering since these films do not need doping or further surface coatings to finish.

Before attempting to tauten tissue covering a check should be made that every panel is *completely* stuck down around all the edges. Any parts with poor adhesion can be treated by rubbing in paste with a finger, or brushing dope under the covering and smoothing in place. If adhesion is poor at any point it is likely to pull loose and produce a wrinkle when the covering is tautened.

The standard technique for tautening tissue covering is to spray or paint with water and then leave to dry. This should be done as soon as possible after completing covering as it will relieve any stresses in the airframe produced by pulling the covering into position.

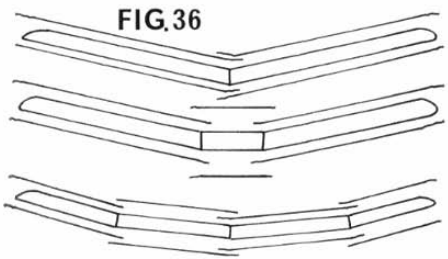


FIG. 36

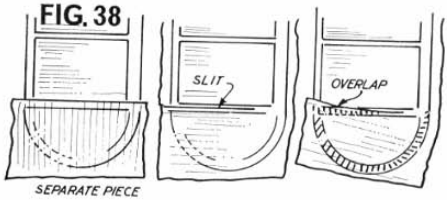
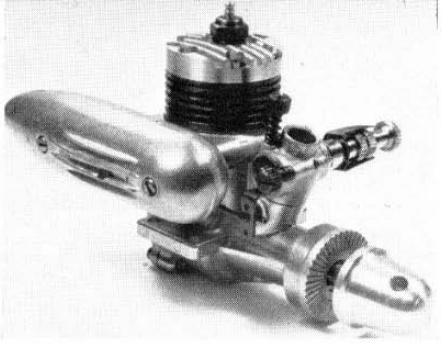


FIG. 38



ENGINE TEST by Peter Chinn

O.S. Max - III 15 R/C

"... a compact, well made engine of excellent all round performance"

ALTHOUGH the O.S. 15 R/C has, for some years and through several models, enjoyed considerable popularity and is just about the most widely used radio control engine in the 2.5 cc. class, it has never been previously dealt with in our Engine Test series.

The history of the Max 15 series goes back to 1955 when the original Max-I 15 was introduced. At that time, O.S. engines were little known in the U.K., but in the following year they received considerable useful publicity when Britain's Ron Draper won the World Free-Flight Power Championship using a Max-I 15. In 1958, the Max-I was replaced by the improved Max-II model and this, too, subsequently achieved a number of important contest wins. The first R/C version was put on the market in the same year. It had a simple butterfly valve, above the spray-bar, coupled to a semi rotary exhaust restrictor.

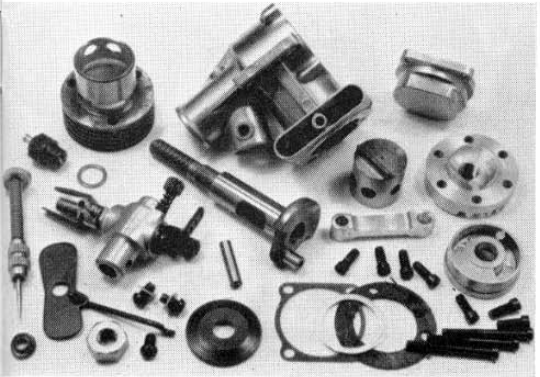
Since that time, many different throttle designs have been used. First, the butterfly valve assembly was replaced by a more refined unit with airbleed control and this, in a further modified form, was continued in the early version of the entirely re-designed Max-III 15 introduced in 1962. In due course, this throttle assembly was replaced by the more complex barrel throttle carburettor and "turn-stile" type exhaust valve unit as fitted to early models of the Max-19 R/C. This still had the needle-valve assembly installed below the throttle, but fuel was taken up, via a short external pipe, to a jet projecting into the throttle barrel. It worked well but was rather vulnerable to crash damage and mis-handling and, with throttle design now becoming more standardised in the larger O.S. R/C engines, it was not surprising to find a scaled down version of the larger throttle being adopted for the 15 and 19 in 1965.

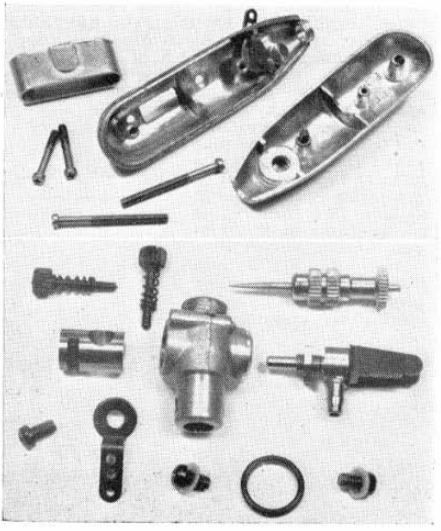
The present carburettor comprises a ground brass throttle barrel, in a neat pressure diecast aluminium body, with the usual idling adjustment screw and an airbleed screw for controlling low speed mixture strength. Fuel reaches the engine through a tee fitting on the needle-valve assembly, which is mounted on the left hand side of the carburettor and feeds directly into the centre of the throttle barrel through an open ended jet. A further change has also recently been made to the coupled exhaust restrictor system. Current engines now have a simpler restrictor consisting of a centrally pivoted blanking plate.

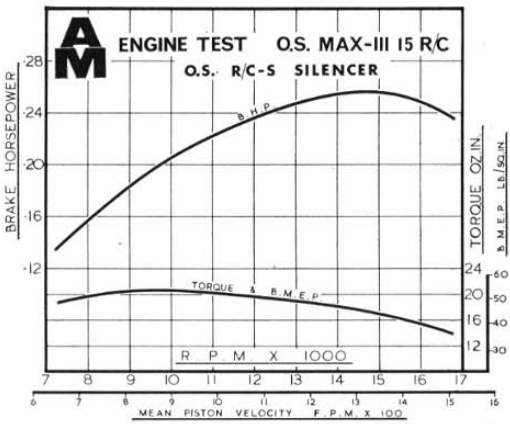
O.S. were among the first manufacturers to offer silencers for their engines and, for the Max-III 15 R/C, one can use either the standard O.S. Jet-stream Type "S", or the Jetstream Type "R/C-S". The difference between these is that the R/C-S type has the addition of a valve, just forward of the outlet nozzle, which, linked to the carburettor throttle arm, takes the place of the normal coupled exhaust restrictor. The silencer, which fits neatly on the engine by means of two internal screws, can be positioned close to the cylinder or, by means of a half-inch extension duct provided, re-positioned so that it is located outside the normal dimensions of an engine cowling. In this latter position the centre line of the silencer is 1½ in. to the right of the cylinder axis.

Turning now to the engine itself, this is notable.

Heading photo shows the Max-III 15 R/C fitted with Jetstream Type R/C-S silencer and optional OS AMA safety pattern spinner-nut. To relocate the silencer outside the fuselage width, an extension adaptor is also supplied. Right: Jetstream silencer incorporates a rotary coupled exhaust restrictor valve. Fitting is via internal screws into exhaust duct. Bottom right: parts of the latest throttle type carburettor fitted to the Max III 15 R/C. Below: parts of the current Max-III display neat design and excellent workmanship.







firstly, for its compact overall dimensions and moderate weight. The crankcase is a neat pressure die-casting, light but amply stiffened in the important places. The hardened and finely ground crankshaft has a large bore gas passage and a long rectangular valve port. This latter registers with a parallel sided intake aperture in the main bearing to give a (measured) valve timing of 30 deg. ABDC to 47 deg. ATDC.

The cylinder has integral cooling fins and is ported for a (measured) 105 deg. transfer period and a 128 deg. exhaust period. The lapped piston has a radiussed baffle and features two 4.5 mm. dia. skirt ports on the transfer side for improved scavenging of the piston interior. These, of course, register with corresponding ports in the lower wall of the cylinder. The connecting-rod is of machined dural.

The cylinder head has a cast-in brass thread insert for the glowplug, which is offset to the transfer side. A soft aluminium gasket is recessed into the head and six Phillips screws are used to secure the head, three of which pass through the cylinder fins and into the crankcase to tie the complete cylinder assembly to the bottom end.

Performance

Our test engine was a Max-III 15 of 1962 vintage to which one of the latest type throttle assemblies was fitted. This engine had previously been used for a standard Max-111 15 test and was therefore already run-in. (In this earlier test the engine had produced 0.30 b.h.p. at 16,000 r.p.m. on straight 3/1 fuel in stock condition and 0.425 b.h.p. at 18,500 r.p.m. on 50 per cent nitromethane running on pressure feed with the venturi insert removed and the standard spraybar replaced by a small jet fed from a separately rear - mounted metering valve.) The opportunity was taken to check the parts of this engine against those of a new 1966 model, but no significant modifications were evident.

An O.S. R/C-S type silencer (with extension adaptor) was used for all tests and was only removed to check power loss attributable to the silencer on typical props. This amounted to 300 r.p.m. on 9 x 4 Tornado nylon.

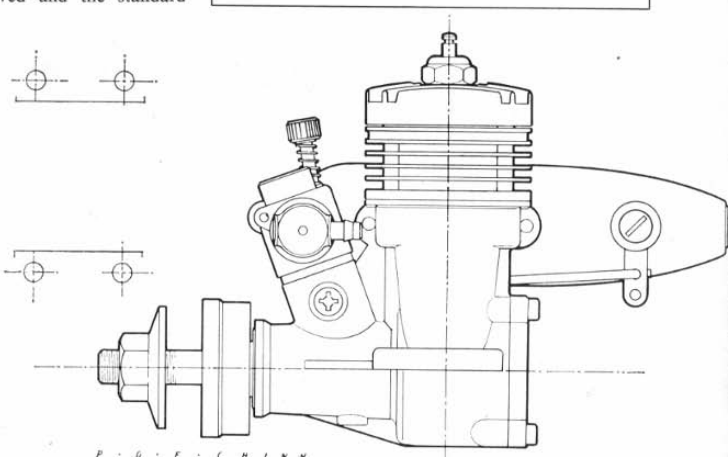
The silencer did not in any way complicate starting procedure. The O.S. silencers have a small priming hole opposite the exhaust port and, for cold starting, it is an easy matter, by turning the engine on its side, to squirt some fuel from the fuel can, into the exhaust through this hole. It is difficult, of course, to judge just how much fuel one is injecting into the cylinder in this way, but, happily, the Max 15 R/C does not seem to be at all fussy in this respect and we had no trouble with flooding.

SPECIFICATION

Type: Single-cylinder, air-cooled, loop-scavenged two-stroke cycle, glowplug ignition. Shaft type rotary-valve induction. Coupled throttle system.
Bore: 15.2 mm. (0.5984 in.) **Stroke:** 13.7 mm. (0.5394 in.)
Swept Volume: 2.486 c.c. (0.1517 cu.in.)
Stroke/Bore Ratio: 0.901 : 1
Weight: 4.6 oz. (5.4 oz with R/C-S silencer and extension adaptor).
General Structural Data
Pressure diecast aluminium alloy *crankcase/front housing* unit with cast-in phosphor bronze main bearing and detachable *rear cover* secured with four Phillips screws. Hardened, counterbalanced *crankshaft* with 9 mm. dia. journal, 6.5 mm. bore gas passage and 4 mm. dia. hollow crankpin. Large diameter counterbalancing prop driver keyed to flat on crankshaft. Lightweight lapped Meehanite *piston* with flat crown, straight baffle, radiussed at base, and two skirt ports. Fully-floating 3.5 mm. dia. hardened tubular *gudgeon-pin* with brass end pads. Machined duralumin *connecting-rod* with lubrication hole at lower end. Machined steel *cylinder* with integral cooling fins and blued external finish. Pressure diecast aluminium alloy *cylinder head* with cast-in brass thread insert for glowplug and recessed 0.4 mm. soft aluminium gasket. Asbestos composition cylinder base gasket. Pressure diecast aluminium alloy *carburettor body* seating on rubber grommet in intake boss and secured with two screws. Ground brass *throttle barrel* in honed bearing surface in carburettor body. Plated brass *needle-valve assembly*. Blued steel, centrally-pivoted plate type *exhaust restrictor* interchangeable with Jetstream "S" or "R/C-S" silencer with or without extension adaptor.

TEST CONDITIONS

Running time prior to test: 3-4 hours
Fuel used: 5 per cent nitromethane, 25 per cent Duckhams Racing Castor-Oil, 70 per cent I.C.I. methanol.
Glowplug used: O.S. No. 7 bar type, platinum filament, 1.5 volt, medium reach (3/16 in.)
Air temperature: 70 deg.F.
Barometer: 29.7 in. Hg.
Silencer Type: O.S. Jetstream R/C-S



The thottle worked well from the start and very little adjustment was found to be necessary. Minimum idling speed obtained on a 9 x 4 Keil Kraft nylon was a mere 2,000 r.p.m. Re-setting the idling adjusment to ensure continuous, safe running at any intermediate throttle setting and instant pick up after a long peiod of idling, we obtained 2,500, 6,600, 8,900 and 10,600 at, respectively, the idle, ¼ open, ½ open and fully open throttle positions.

Maximum prop. r.p.m. figures included 9,500 on a 10 x 3½ Top-Flite wood, 10,300 on a 9 x 4 Top-Flite nylon, 12,100 on an 8 x 5 PAW wood, 13,800 on an 8 x 4 PAW wood and 14,400 on an 8 x 4 Power-Prop wood.

On test, maximum torque was developed in the region of 9,500-10,000 r.p.m. where the Max 15 R/C recorded nearly 21 oz. in. Torque declined quite slowly as load was reduced and resulted in the very good output indicated of nearly .25 b.h.p. at between 14,500 and 15,000 r.p.m. This is a very good performance, above average for a silencer equipped 2.5 cc. R/C engine running on 5 per cent nitro fuel.

We found the Max 15 R/C notably free from excessive vibration over the entire useful speed range. The special prop driver, internally counterweighted to supplement the crankshaft counterbalance, may help here, although its effect is likely to be beneficial only if the engine is very rigidly mounted to eliminate the out-of-balance effect thereby introduced at the front end. When propped for r.p.m. below 10,000, the Max 15 lost power as it warmed up, but this loss disappeared under lighter loads and was turned into a gain at the highest speeds, the engine picking up 600 r.p.m., for example, on a 7 x 3 PAW prop.

Our tests confirmed much of what is already known to Max 15 R/C users. To sum up, this is a compact, well-made engine of excellent all-round performance.

Power/Weight Ratio (as tested with silencer): 0.74 b.h.p./lb.
Specific Output (as tested with silencer): 99 b.h.p./litre.

FREE FLIGHT COMMENT by J. O'Donnell

continued from page 562

November meeting. Anyone flying more than one class is going to have a very hectic time, with success depending on how much help can be obtained towards retrieving and timing.

Most of the prospective trials entrants with whom I have spoken seem *very* apathetic about the whole affair. There is obviously little real attraction in the prospects of winning the opportunity to pay one's own fare to Czechoslovakia—and the trials are no longer the important event of *the* year to either the S.M.A.E. or the fliers.

Suggestions for moving the trials' dates have met with little support although an assortment of practical reasons have been given. It is perhaps significant that the R/C fliers have been more successful in having their trials moved to next year prior to April because their sub-committee claims that techniques may change from '66 to '67.

Other news from the recent (early August) S.M.A.E. Council Meeting includes the abolition of the 100 metre square launching area for gliders. This has speedily been recognised as producing what it was supposed to discourage *i.e.* tactical flying. The late results submitted for the first two Area centralised events this year have been accepted as valid. This gives the *Frog Senior Cup* to Graham Head instead of Alan Moss, and the *Gamage* to Jon Clements instead of Brian Day. It also upsets all *Plugge* scores.

The long overdue awards of badges and certificates from the 1964 and 1965 season have also been discussed, and some action has been promised for those still waiting. When present stocks are depleted, an alternative to the badges is to be issued. This will be in the form of an engraved shield carrying the Society Badge and appropriately metal plated laurel leaves.

I also hear the the S.M.A.E. officers are very strongly in favour of a return to Hullavington for next year's **Nationals**—despite its demonstrated unsuitability for free flight. The British National *Flying Championships* should surely be considered as such, and not simply as a glorified camping holiday-cum-garden party. Could I point out that f/f still supplies *most* of the competitors and this alone should justify efforts to provide adequate facilities.

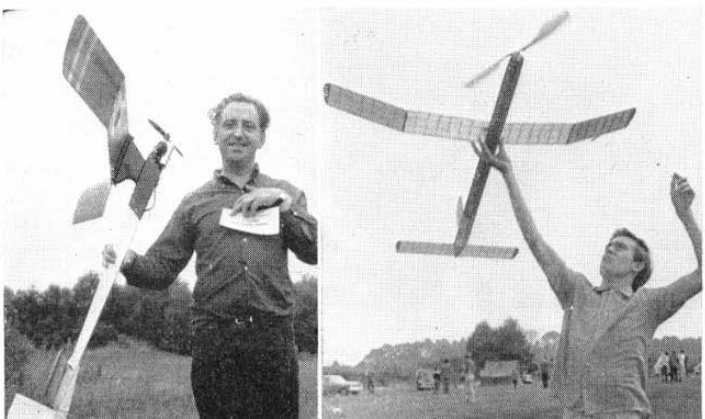
There is definite connection between this year's Nationals and the suggested rule revision to allow three (instead of two) models to be used in a contest. It would seem that it won't be long before we are *expected* to lose one model per flight!

HAYES GALA, CHOBHAM. 7th August 1966

Rubber fly-off 1. D. Wiseman (York) 9:00+4:29 2. F. G. Sharp (Blackheath) 9:00+3:52 3. D. Hipperson (Croydon) 9:00+3:3. **Glider** fly-off 1. J. O'Donnell (Whitefield) 9:00+5:04 2. D. Glue (Brighton) 9:00+3:05 3. C. Hayward (Croydon) 9:00+1:5. **Power** fly-off 1. R. Johnson (St. Albans) 8:46 2. G. Fuller (St. Albans) 8:39 3. G. Cornell (Croydon) 8: **A1 Glider** 1. C. Morris (St. Albans) 7:11 2. C. Hayward(Croydon) 6:31 3. M. Dilly (Croydon) 5:38. **½A Power** fly-off 1. D. Hipperson (Croydon) 7:21 2. J. O'Donnell (Whitefield) 6:54. 3. J. Boxall (Croydon) 6 53. **Tailless** 1. A. Rogers (Leatherhead) 5:51 2. P.Hedgeman 5:023. A. Slater (Leatherhead) 4:43.

SOUTH COAST GALA. Tangmere 24th July, 1966

Glider 1. M. Coomes (East Grinstead) 4:46 2. K. Smith (Croydon) 4:16 3. L. Barr (Hayes) 4:10 **Rubber** 1. M. Reeves (Lee Bees) 3:00 2. J. O'Donnell (Whitefield) 2:25 **Power** 1. J. O'Donnell (Whitefield) 6:09 2. N. Witchell (St. Albans) 5:37. **F.A.I.** 1. J. O'Donnell (Whitefield) 2:35. **½A Power** 1. J. O'Donnell (Whitefield) 6:00. **Coupe d'Hiver** 1. W. Horton (Crawley) 1:55 **A/1 Glider** fly-off 1. K. Smith (Croydon) 3:01. **Chuck Glider** 1. A. Slater (Leatherhead) 2:28 **Tailless** 1. H. Torrode 1:18.



Chobham Champs, George Fuller left, Dave Hipperson right seen at Hayes Gala, August 7th. George placed 2nd in power and is seen displaying his "I flew at Glenview" placard, Dave made second in the rubber fly-off with 9:00 and 3:3.

SILENCERS and NOISE

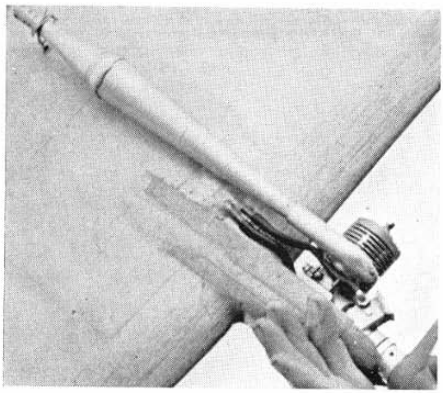
Part Five :—Manifolds for radial and side exhausts.

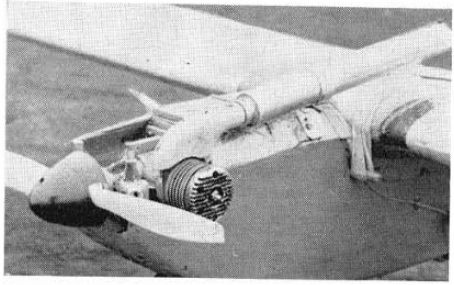
by Mike Larcombe

IN part one of this series we have shown how to design and make efficient tuned-length silencers without saying too much about how they can be adapted to fit different types of motor and how much power they use especially in the case of motors with sub-piston induction. There is no real problem with single exhaust-port motors (loop scavenged type, e.g. Super Tigre, Merco M.V.V.S., etc.) since all that is required is a smooth transition from the rectangular port to a tube as shown in Fig. 1. Manifolds of this type have been made from magnesium for a number of Super Tigre G 15's, OS 50, and a Merco 61, but they can easily be made from any lightweight material without the use of elaborate tools. The rear hole is first of all drilled in the block of metal and a number of smaller holes drilled in the side. The complete inside can then be finished using a rotary file with a $\frac{5}{16}$ in. dia. spherical end fitted in a portable drill. The outside can then be filed by hand to leave a wall thickness of about $\frac{1}{16}$ in. Although the wall thickness can be reduced to decrease the weight this is not advisable since it makes the assembly weaker and increases the noise due to vibration of the manifold and silencer assembly. The majority of our tests have been made with manifolds sealed to the motor with "Plastic Padding" to give a gas-tight seal, but at present we do not know whether a leaky manifold will affect the power, but it certainly does increase the noise. Tests have been made on these manifolds with and without air holes drilled in the front and no noticeable effect was found, except to increase the noise. All these tests were made on motors with sub-piston induction therefore showing that the manifolds have little effect on these types of motors.

Fig. 2 shows a typical simple manifold assembly for a side-port motor utilising an aluminium cigar tube, which in effect is similar to many commercial designs. This type is inefficient if a tuned-length silencer is to be used since the exhaust gases suddenly expand into the chamber and are then reflected directly back into the motor from the opposite wall of the tube.

Fig. 3 illustrates a much better method of making this simple type of manifold in which the end of the tube is flattened to about the same thickness as the exhaust stack, and fillets of "Plastic Padding" added to the front of the tube and the radiused rear end of the stack. The side-port motors have the advantage that the silencer can be located external to the model and can therefore be fitted to most existing models without too much difficulty. For speed and team race flying there is a distinct advantage in having the silencer inside the model so reducing the drag, and also for scale and stunt designs it is better from the point of view of appearance to situate the silencer inside the model, as well as having the added advantage of reducing the noise generated by the silencer structure. A manifold for side-port motors can be designed so that the outlet pipe is in line with the motor centre-line as in Fig. 4, but it is not easy to

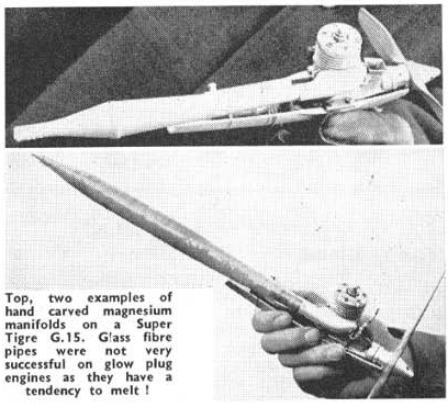




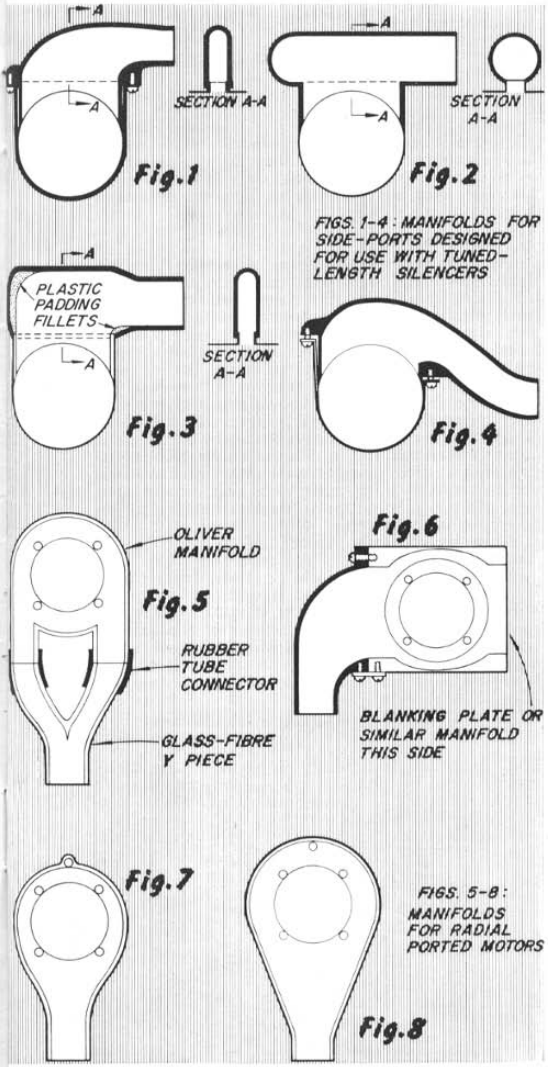
Left, Super Tigre G.15 with tuned length pipe in Richard Wilkens' 'E-Type Early Bird'. With its lightweight structure and 7 x 6 propeller it flies at 104 m.p.h. and turns really tight, also its disintegration pattern is something to be seen ! Below; not only for control line, a tuned length absorption type silencer on a Super Tigre radio control engine, very quiet in operation.

construct. The type of motors which are the easiest to fit tuned-length silencers to are those with rear facing stacks, such as the M.V.V.S. where the power loss due to the manifold is negligible.

It is difficult to design and construct an efficient manifold with a single outlet pipe for multi-ported motors such as the Cox with 2 side-ports and the



Top, two examples of hand carved magnesium manifolds on a Super Tigre G.15. Glass fibre pipes were not very successful on glow plug engines as they have a tendency to melt !



ETA 15, Oliver, Webra, etc. with 360 deg. radial porting. The ETA and Oliver commercially available manifolds convert the radial porting into two outlets, the ETA type being designed for silencers external to the model, and the Oliver type for an internal silencer. Both of these can be adapted for fitting tuned-length silencers, as shown in Figs. 5 & 6. The Oliver type can be fitted with two tuned-length sections to each outlet pipe or a Y piece converting the two outlets into a single tube. The ETA manifold, although removable, is similar to the E.D. Racer and either one or two of the manifolds designed for single side-port motors (Fig. 6) can be fitted. Needless to say, a blanking plate must be used on the opposite port if a single outlet is to be used. The Webra silencer and manifold can probably be adapted to suit tuned-length silencers by removing the baffles, converting the rear end to accept the silencer and fairing the front end of the expansion chamber with "Plastic Padding".

Our own designs for Oliver and Eta motors have been centred around attempting to make a manifold with a single outlet pipe directly behind the motor. The first of these, shown in Fig. 7, which was used for the tests in Part 1 was not too successful since an attempt was made to make a small manifold that would easily fit inside a model. The manifold alone dropped motor revs from about 15,000 to 14,000 due mainly to the fact that the exhaust gases from the front port are reflected directly back into the motor and also the gap between the cylinder holding-down bolts and the manifold was too small, thereby restricting the flow of gases from the front and side ports. The latest design, Fig. 8, has overcome this problem and motor revs have only dropped from 15,000 to 14,700, although the manifold itself is rather large. Both of the above mentioned manifolds were machined from solid Magnesium and are probably not easily made by the average modeller unless a good lathe is available. We hope that by presenting the information here that some manufacturers may consider marketing a manifold with a single circular outlet. New motor designs may even benefit from the adoption of built-in exhaust stacks with the crankcase rather than some of the present types in which the manifold is an afterthought.

"I told you he'd want to play with it."

TOPICAL TWISTS

by 'Pylonius'
illustrated by 'Sherry'

Young Blade

Surely a pair of Golden Wings is insufficient reward for the lad who wrote that priceless letter about the 6 ft. propeller. He claims to have bought the Bond sized airscrew at the surprisingly economical price of 1.333d. per foot (there must have been a twist in it somewhere !) Anyway, he carried home the aeronautical trophy a whole mile through pouring rain (but not, apparently, in the pitch dark), and his mother said, "Do you mean to say you've sold our cow for that. . . . " Or is that another story ?

Anyway, if you happen to know which aircraft it came off, you can only hope it had a jolly good glide.

Family Circles

It has been brought to my amazed attention that as many as six pairs of brother teams made an appearance in the C/L Champs. But why model flying should run in families in this way only a geneologist could, perhaps, enlighten us. According to the famous biologist, Guy Rait, proneness to model flying usually occurs in the second child, and would do so in the fifth child if it were not for the fact that every fifth child is Chinese, and not allowed to play with westernised toys. Slope soaring predilections are, of course, to be found in the direct male descent, whilst the female line remains one of constant complaint about the silly waste of time.

Radio flyers may complain about 'the missing link' as they watch their brain children go o.o.s., but some evolutionary theories are looked at askance as modern model man endeavours to climb a formidable tree in true ancestral style.

A Leg Up

I had thought that the idea of man made flight had long reached its last extremity, all 90 ft. span of it, but I see the lads of the levitation brigade are still eager to acclaim the triumph of brawn over brain. The great Daedelus venture has not yet been written off as a dead loss, though enthusiasm seems to run in cycles, or the bits and pieces thereof required for the pedalling system.

The basic trouble is that the old homo sap has a pretty rotten strength to weight ratio, unlike the birds and the bees. from whom he learns so much in other directions. He may be able to nip along a bit smartish on the flat, but his efforts at risability are risible to say the least. Mostly the flight attempts of the half bike, half kite contraptions have been of the sitting down, standing still variety, although it must be said that one or two have risen to the task, very much ardua, though hardly ad astra.

Much interest is now centred on the latest home-made pedalo of the air, which is of the fly in the parlour type. It will be open house when the velocipede cum helicopter makes its airborne debut, but will the paperback rotor reach the top of the navigation charts ? If not, then the day may yet be saved by an idea of mine which should set the backroom boys agog. It's all a question of storing up the muscle energy. Instead of a do or die pedalling stint on a straight couple to the propellor, you whack in the revs per foot into a dirty big rubber motor. A good hours pedalling should see you fully wound, and after that you may well be flying the Wakefield of the future.

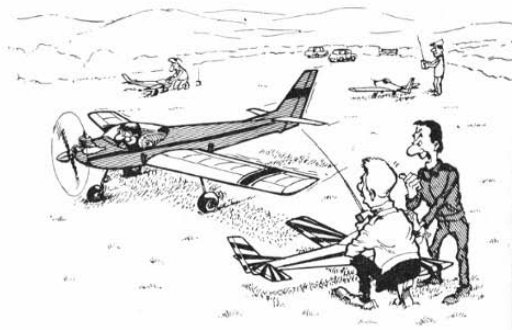
Signal Discovery

Fly Away Peter will, perhaps be happily flying his free flight model, in which case he's prepared for the losing gambit, but Fly Away Paul will have no such weather eye to the horizon when his frantic R/C signals fail to get obedient response, in which case he'll be tearing out his vitalis growth in despairing handfuls.

But how can he hope to retrieve his wayward but expensive creation ? According to a recent article on the subject his main chance seems to lie in calling a spotter plane to the rescue, but how many of us know a friend in need who owns a light plane? And unless you live down Bristol way, where Radio jobs scour the countryside with cine camera eyes, you will no doubt return to horizontal steam engines a sadder and wiser man.

Now, it strikes me as odd that, in these days of transistorisation, when, if you can't hear a pin drop, you can fit a microphone to its head, we modellers cannot somehow 'bug' our machines with small locatory gadgets. Such fitments should at least prove or disprove that mysterious 'hole in the ground' theory, based on those frustrating occasions when, having seen the model land in a clearly identifiable spot. the most painstaking search fails to bring it to light.

"He reckons it's the latest form of controlled flying."



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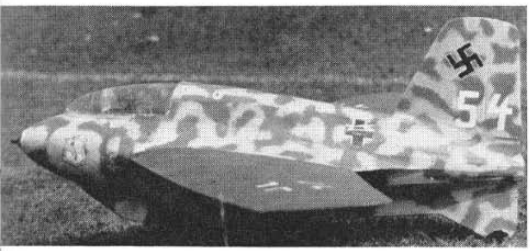
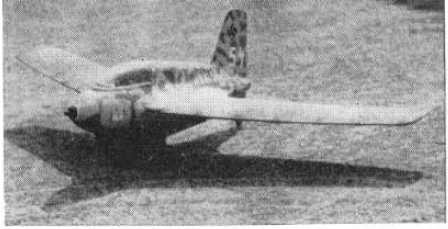




Messerschmitt KOMET Me 163

ONE of the most interesting aircraft to appear in the last war was the Messerschmitt Me. 163 *Komet*. The story of the development of this machine is told in the book "Rocket Fighter" which contains, in addition, a wealth of photographs. Some four examples are in this country, Science Museum—South Kensington, Imperial War Museum, College of Aeronautics (Cranfield) and R.A.F. Colerne.

From the modelling aspect, the *Komet* offers something different, especially as a glider and it is interesting to note that a glider version was actually built by the Japanese, for training purposes. It was of wooden construction and some fifty were built, with the designation MXY7, *Akigusa* (Autumn Grass).

Construction has been simplified by the use of thin card for formers, note the turned flanges for stringer fixing. The more ambitious modeller might try to bury a Cox .010 in the nose or modify the tail end for Jetex, but it is with the glider version we are concerned here.

Start the fuselage with the nose cone, fabricated from a series of rings A to E, and built-up segments F to K, which, after cementing and dry are roughly shaped. Next, build a basic frame, shown shaded, this includes members marked with an asterisk. To this frame, formers 1 to 8 are added, these being reinforced as on the drawing. Ensure squareness in assembling these. Continue with stringering, starting with "f", these pass thro' formers 2-5 and stabilise the structure. Spar on formers 2 can now be located and cemented, followed by all other stringers and centre section structure. The balsa nose cone and decking complete this part which can now be sanded, covered and doped.

Fin and rudder are built over the plan, and covered and doped before cementing to fuselage, with stiff paper fairings added at the root.

Wing-root fillets are built up in a similar way by first locating fillet profile strips and leading edge segment. This is probably the most difficult part, obtaining a good faired line. The fillet is completed by using two or three sections of stiff paper, upper and lower. This is best accomplished by trial and error method, i.e. laying a piece of paper over area to be covered, marking outline, cutting roughly, fitting and trimming.

Commence wing construction by cementing root rib complete with tongue to main-spar and proceed to build over plan, cementing tip rib in place. This is so slotted to give correct wash-out. Leading and trailing edges are now added followed by the remaining ribs. The slots in these gives latitude for movement when assembling. Cement these well. Auxiliary spars and tips complete wing structure. Sand lightly, cover in lightweight tissue, water shrink one coat of *thinned* dope and paint. Two light coats of Humbrol matt were required.

The "Keel" or skid member is made by cementing balsa components to one card side and when dry adding the other side. P.V.A. glue is best for paper card parts.

When cementing keel to fuselage, ensure that it is vertical and on centre line.

Cockpit detail, expanded polystyrene pilot may now be added. Alternatives for the cockpit canopy are (a) to modify an existing radio model bubble-type cover to obtain an approximate shape (b) to make a balsa canopy and hollow same, paint in light grey or blue gloss pick out highlights in white, (c) press mould shape in acetate sheet .020 in. thick with male and female moulds, softening acetate on a frame over an electric fire. This was used on my model, two or three attempts to get a "good one" being needed.

Finishing

Construction is completed with the aerial, tail wheel and dowel thro' keel and paper fillets between keel and fuselage.

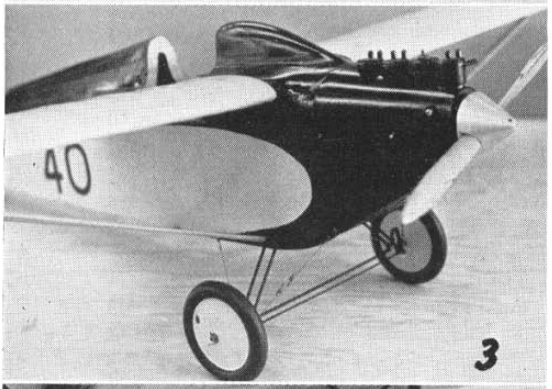
The Feb., 1965 issue of *"Flying Review"* gives a nice colour plate of Me. 163 decor.

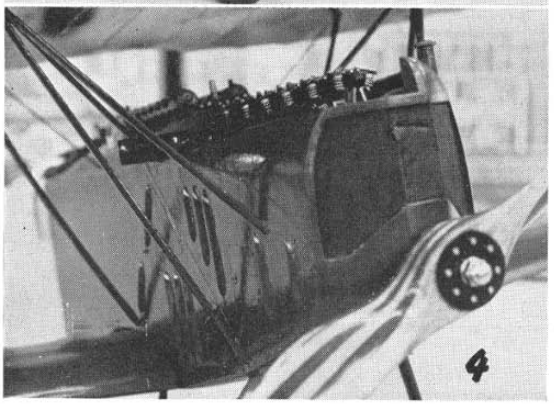
Mottling can be obtained by applying light base colour, when dry to stipple darker areas, fading the edges with a cotton wool pad.

Trimming & Flying

As built, the model will be tail-heavy, so a quantity of Plasticine should be inserted into the nose cone for coarse trimming, followed by lead shot pressed into it for final trim. Directional trim is made by means of the rudder, the model being sensitive to quite small movements. When trimmed correctly, the glide is flat and fast, and a launching technique has to be acquired. But to see it in flight is fair compensation for the building effort. As a slope soarer it is very successful, it will travel farther than you think. The dowel is intended for catapult or tow launching.

This 1/12th scale glider is 30¾ in. span having unusual stiff card and balsa construction. Model in top views. At left is example at Cranfield (AM215) with yellow 15 outlined in black.





SCAL
STAR
Photographed

1) Donald E. Roetman made this detailed Beechcraft D17S, 1¼″=1′ control line scale model. Detail extends to fully sprung undercarriage which retracts, flaps, throttle, landing lights, navigation lights and interior lights work and the model is fully furnished. Powered by Torpedo .35 weighs 5¼lbs and has 40″ span.

2) The Bower's Fly Baby is a popular subject. This 50″ version by Elliott Dickerson weighs 5¼lbs and is powered by a K & B .45. All controls including throttle work from the cockpit, panels open and turnbuckles operate on rigging.

3) Unusual Free Flight Scale choice, a Church mid-wing by W. H. Kehr to 1/6th scale for Cox T.D. .09. Span is 57″ and weighs 28¼ozs. The undercarriage shock gear works like the real thing.

4) Close up of Fokker D. VII by Richard D. Meixell (A.P.S. designer) to ¼th scale for Free Flight with inverted Cox .049 Medallion. Scale engine has over 600 parts. Weighs 28ozs. and has a 40″ wing span.

5) Nieuport 17 Free Flight scale is 1/10th full size with .8cc diesel. Built by Bruno Markiwicz.

6) Adventurous scale subject is Loren Tregellas's "Delt-Air 250". Actual aircraft crashed on first flight. Model has pusher Super Tigre 60, Bonner proportional radio, working lights and retract gear, weighs 10¼lbs for its small 45″ span.

7) Ken Bard and his mighty Junkers Ju-87 B-2 to ¼th scale has Kraft 12 reed gear, weighs 8lbs and is powered by Super

Tigre .56. Desert camouflage colours and small prop make it look strange.

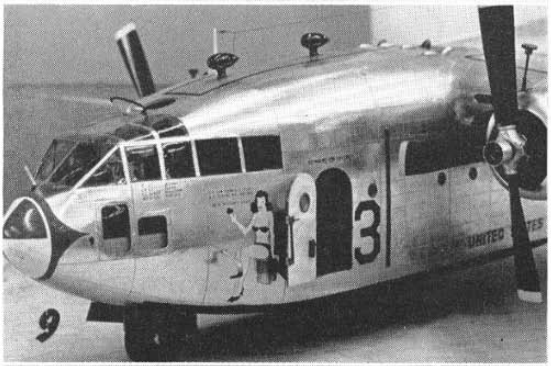
8) Superb finish to Joe Coles' Grumman FIIFI "Blue Angels" Dyna-jet powered control-line entry, weighs 7½lbs and is 36" span.

The Fairchild G119C Packet has one McCoy .35 and a K&B .35. Entered by William Koster it has working undercarriage flaps, lights, doors and throttles. Scale is 1/24th span 54½".

10) Sleek Piper Twin Comanche is 1/6th scale (72" span) for two Veco .45s Weighs 14½lbs has retractable gear, brakes, lights plus full house control from 12 channels. Designed and built by Fritz Lindgren.

11) Winning Grumman F8F Bearcat "Gulfhawk the 4th" by Warren MacZura was proxy flown also at the World Champs by Bob Gialdini. Span is 35½" weight 4½lbs and scale is 1/12th. Flaps, throttle and lights operate, engine is a K & B .35

12) Control line scale P 51B Mustang by Bob H. Taylor is 1/12th, has Super Tigre .46 and as can be seen, an equipped cockpit complete with clothed dummy pilot.

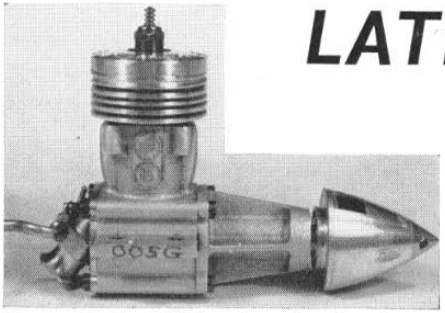


Richard Stouffer at the

1966 U.S.A. NATS

LATEST ENGINE NEWS

By Peter Chinn



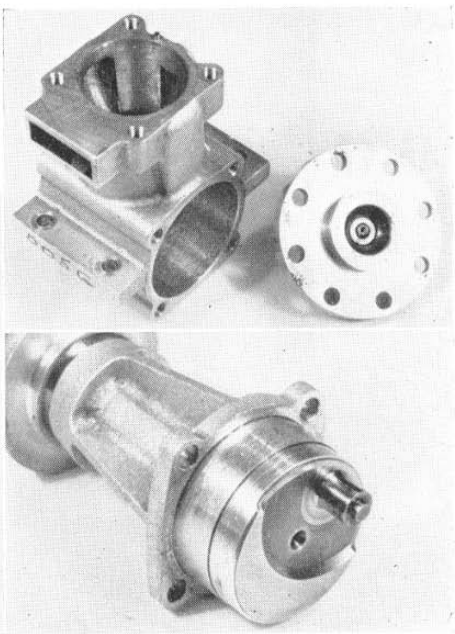
The new Austrian HP-15G racing engine above has two Schnuerle transfer ports and one boost port. Claimed power output is 0.48 bhp at 25,500 rpm for glow version. A water cooled version and a diesel conversion, the HP-15D are also being developed, the team race version being claimed to deliver 0.45 bhp at 18,500 rpm. The HP-15G shown is the first example to reach the UK, a pre-production model owned by Gordon Farnsworth.

THESE words are being written two weeks before the World Control-line Championships at Swinderby and one of the engines we expect to see in action there is the new Austrian HP-15G international class speed motor. Heinz Freundt, of Salzburg, used one of these engines on June 25th to establish a new 2.5 cc. class Austrian record at 225 Km/hr—nearly 140 m.p.h.—a most impressive beginning.

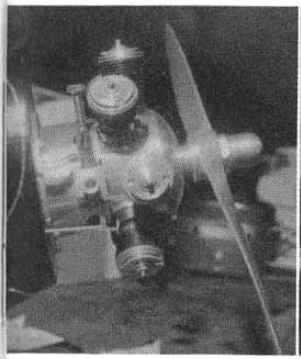
The HP-15G was designed by Paul Bugl who, for many years has been making contest engines, first diesels and later glow engines also, for his own use and for the use of a few of his friends. More recently, these engines have been placing quite high in international T/R and speed events and with the adoption of this latest design, for regular production by Hirtenberger Patronen, an old established Austrian precision engineering firm, we may expect to see a good deal more of them.

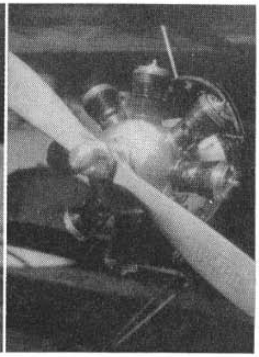
Whether or not the HP-15G succeeds in seriously challenging the position of the established commercial 2.5 c.c. speed motors, such as the Super-Tigre G.15, it remains one of the most technically interesting production engines to emerge for a very long time. Speed flier Gordon Farnsworth. who, as a result of meeting designer Paul Bugl, was one of the few people in the U.K. to know of the impending appearance of this new Bugl engine as a commercial item, is the possessor of one of a pre-production batch of HP-15G's and was kind enough to loan the engine for examination and comment in L.E.N.

In appearance, as the photos show, the HP-15G does not look much like the traditional idea of a speed engine—mainly because of its small exhaust duct and



Parts of the HP-15G. Top right: crankcase, showing disposition of transfer passage and small exhaust duct, also squish band cylinder head. Bottom right: shaft and front housing are the only conventional parts of an otherwise highly unorthodox design. Immediate right: complex Schnuerle ported cylinder and piston assembly, with oil slotted connecting rod big end, note boost port piston window. Head fins are push fit on the liner which is slotted to accept a crankcase pin to prevent rotation in the crankcase.





Radial engines have always had an attraction. The Morton M5 5 cyl. four stroke later made by Burgess is now very much a prized collector's item. This, however, is one with a difference as those who perceive that it has 8 cylinders will realise. It is in fact an "X" engine with four Cox 15 cylinders working and four as dummies on a Lou Andrews' Aeromaster R/C Biplane at the US Nats, made by William Brice. S. Portland, Maine.

the lack of a large transfer passage on the other side. A peep inside soon shows that the engine, in fact, owes very little to current practice in commercial speed motor design.

Two major features distinguish the HP-15G from its competitors. The first is the unusual bell-valve rear induction unit and the second is the Schnuerle type cylinder porting.

The engine is set up for a pressurised fuel supply with crankcase pressure tapped from the upper right hand backplate screw. Fuel is fed to a 7 mm. venturi throat through five peripheral jets via a collar containing the needle-valve. The intake itself is inclined steeply upwards into the backplate and brings the intake port through the upper inside edge of the backplate, instead of through the front face of the backplate. The case-hardened steel bell valve, which controls the flow of gas through this port, is in the form of an external drum with a large induction slot in its wall and has a 3 mm. centre spindle running in a bronze bushing in the backplate. The induction slot is very much longer than the intake port, as a result of which (unlike the normal disc-valve), the port is fully open for just over half the 180 degree induction period. Actual timing however, is orthodox at 45 deg. ABDC to 45 deg. ATDC.

The cylinder assembly is of highly interesting design. It comprises a hardened steel cylinder liner (flanged just above port level and pegged to prevent it from turning in the crankcase casting), a separate machined aluminium finned outer jacket and a plain machined aluminium cylinder head with wide squish band and hemispherical combustion chamber. The liner has a single exhaust port of relatively small area, timed to open and close 67½ degrees (measured) each side of BDC. It is flanked by the two Schnuerle type transfer ports, angled to direct incoming gas away from the exhaust port. Diametrically opposite the exhaust port and angled sharply upward through the 1.5 mm. thick cylinder wall is a small boost port. All three transfer ports are timed to remain open for 127 degrees of shaft rotation.

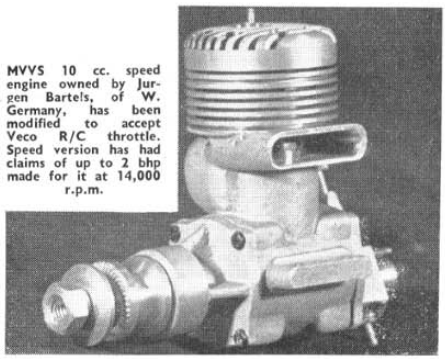
The flat crown piston is of special cast-iron and is extensively machined. In addition to a boost port window in the lower right hand side of the skirt, it is liberally cut away below the gudgeon-pin bosses to eliminate any obstruction to gas entering the main transfer passages. There is plenty of meat around the bosses to provide support for the 4 mm. gudgeon-pin but the remaining portions of the piston skirt are kept quite thin to reduce weight. Incidentally, unlike most high performance glow engines, the HP-15G has a relatively long stroke, the stroke/bore ratio being 1.04 derived from a bore and stroke of 14.5 x 15.1 mm.

The crankshaft is case hardened with a machined-in crescent counterbalance, 7 mm. journal and 5 mm. crankpin. It runs in a 19 mm. O.D. ball journal bearing at the rear and a 14 mm. O.D. ball journal bearing at the front. The standard prop drive fitting is a duralumin hub, mounted on the shaft end via a steel split taper collet. (The spinner assembly seen in the photos is non standard and is, in fact, a G.15 Super-Tigre component.)

It is planned to offer the HP-15 in three models, namely, the HP-15G just described, a water-cooled marine version of the same engine and a diesel derivative the HP-15D. This latter is, perhaps, even more interesting than the glow model in that, according to the maker's test of prototypes, it delivers an output of 0.48 b.h.p. at 20,000 r.p.m. when running on pressure feed with a 7 mm venturi. This is well above the best figures we have recorded on any 2.5 c.c. diesel tested to date. In team racing form on suction feed with 3.6 mm. venturi, the engine is claimed to deliver 0.45 b.h.p. at 18,500 r.p.m. The glow version is rated at 0.48 b.h.p. at 25,500 r.p.m. on straight FAI fuel and, of course, on pressure.

In Brief

New engines recently tested include 2.5 c.c. Ueda 15 and 1.7 c.c. Webra Sport-Glo. Ueda proved disappointing and, we understand is undergoing further development by manufacturer. Two examples were tried. Both started well but lacked power and vibrated badly. Two examples of Webra were also tried. These were fairly evenly matched as regards power. Slightly reluctant hot starting but good power output. New Webra silencer for this engine is very good. We shall be reporting more fully on the Webra —which is available in standard and R/C versions in due course.



MVVS 10 cc. speed engine owned by Jurgen Bartels, of W. Germany, has been modified to accept Veco R/C throttle. Speed version has had claims of up to 2 bhp made for it at 14,000 r.p.m.

John O'Donnell's....

WHILST the Woodford Rally, reported separately, is practically on my doorstep the other meetings I attended in the last month have involved a lot of travelling. The **South Coast Gala** was held on 24th July at Tangmere Aerodrome which is just about as far from Manchester as possible. It was really too far for a "day trip" as even my co-driver (Mike Reeves) was convinced by the time we got home. Nevertheless it was justified as we made five flights between us, and collected four firsts and a second.

Conditions on our arrival were hardly inspiring, being overcast and windy and most of the small f/f contingent were more interested in talking than flying. Martin Dilly experienced a D.T. failure on a test flight with his A/1—the model subsequently landing in East Grinstead, 35 miles *nearer* his home. A couple of bright periods encouraged me to fly early with my *new* ½A model (complete with V.I.T.). This, plus doubling up open and ½A, proved to be the right approach even though I lost the model on its second max. Only St. Albans member N. Witchell got near my score. Peter Manville did a good first flight off an over-run, had a lot of trouble retrieving, and did not continue.

Most activity was in glider, Mike Coomes winning with two very good flights totalling 4:46 flying a "Wichita", whilst Ken Smith (who also won A/1) and Laurie Barr were not far behind. Rubber was a single max victory for Mike Reeves who recovered his rather fragile model intact through landing in corn in full view of John West (waiting downwind for a clubmate's model). Mike then practically stumbled on Laurie Barr's glider whilst walking out with his own model!

There was a burst of frantic activity just before the contest close when contestants realised just how low were scores in some events. The mid afternoon rains had also abated somewhat. Bill Horton won Coupe d'Hiver with a single thermal fligh that Jack Allen couldn't equal with three short flights. I managed to cram two flights (open rubber and All-in F.A.I.) with a Wakefield into the last ten minutes thanks to a lift back in the Horton's van. The remaining events, chuck glider and tailless were taken by Tony Slater and H. Torrode.

A rather wet prize-giving concluded what must have been a very disappointing day to all involved. The prizes were obviously reduced below that envisaged for better weather (and entries).

The **Hayes Gala,** at Chobham a fortnight later, started with a very welcome surprise when Kath Allen presented me with a rather faded but otherwise undamaged, ½A model! Its return had also involved in turn a farmer, the R.A.F., and Norman Couling—all unbeknown to me!

The contest itself was not very well supported although the weather could hardly be considered bad. It was breezy but the direction was quite good. Support for both power and ½A was poor and winners Dick Johnson and Dave Hipperson (back flying ½A again) failed to max out. The rubber fly off seemed rather empty with only four qualifiers and was won by Dave Wiseman with 4:49 despite having lost his best model on his second max. The other three picked rather poor air.

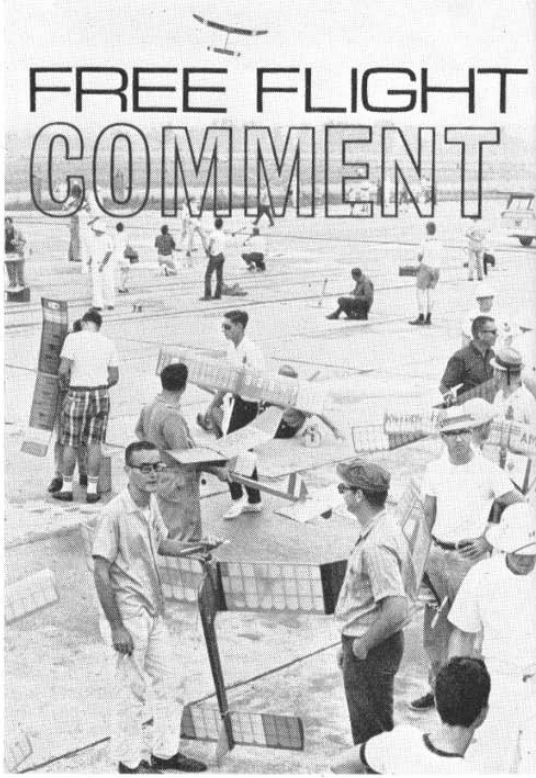
There were three in the glider fly off, and 14 out of the allowed 15 minutes fly off period was spent waiting for someone's nerve to break! Chris Hayward went first, rapidly followed by myself and Dave Glue. The lift was *very* weak and my model was the only one to really hold it.

The most interesting model at the event was probably the tailless winner—an *all sheet* power model of Tony Rogers. This had a Mills .75, a Star 7x3 prop. and an Elmic Airdraulic timer. It seemed quite stable and thermalled very nicely on one flight. Another entry was Tony Slater's powered "Saucer" that I initially mistook for a sports model!

As the future of Chobham will undoubtedly have a considerable effect on London district activities, and the proposed Motorway extension is being the subject of a public enquiry I wonder just how the S.M.A.E. has arranged for our interests to be represented?

A recent letter from Frank Monts (whose model I proxy flew at Chavenay) contained news of the **U.S. trials** to select their f/f teams for 1967. The successful entrants were Bill Langenberg, Bob Van Nest and Hugh Langerinin A/2, Bob Cherny, Doug Galbreath and Joe Wagner in power, and John Lenderman, Herb Kothe and George Xenakis in Wakefield.

The American trials were held at Bong A.F.B. just before their Nationals, took three days and meant 15 flights per event. I saw some of the pre-trials literature and it looked very impressive.



Class B free flight line up at Glenview, USA, for US Nationals where George Fuller was placed 3rd.

The U.S. Nationals (F/F) will doubtless have photo-coverage next month but mention must be made of British participation by George Fuller. Over on a holiday/business trip he flew his Eta 29 stretched "Dixelander" derivative to third place in "class B Gas". A first flight of 4:25 O.O.S. in murky conditions robbed him of a perfect score (three fives) and a chance of flying off against Canadian R. Higgs who won. George's general comment on American power models was "big and slow"!

The **British f/f trials** are fast approaching, especially as the first trials and the Southern Gala have just had their dates switched. Information regarding arrangements, flying system, etc., for the trials is conspicuous by its absence—and from conversations with S.M.A.E. officer's and delegates would appear not to have been discussed at Council Meetings. Available daylight will inevitably limit flying hours, especially at the

(*Continued on page 553*)

Satisfied customers troop away at Woodford Rally with ex supersonic balsa wood from B.A.C. surplus thanks Mr. Wilson ! It's an ill wind. . . .

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

Dear Sir,

I have been puzzled often how you find the centre of gravity point. As I would like to draw up my own plans for a rubber model. In Whitsun we went to the British Nationals, it was the first model show I had been to and I was very impressed. Could you please tell me how to find the C. of G.?

Gosport, Hants. *S. Shilling.*

Finding the centre of gravity of any model is a simple matter but don't forget it must be in full flying trim as the addition of wheels and engine etc., can appreciably change the C. of G. position, also the position shown on kits and A.P.S. plans is the final position, i.e. with the model doped, fuel proofed etc. Pick the model up in flying order and place your two index fingers under the wing, one each side of the fuselage. Move the model backwards and forwards until it balances on your fingers and this is the correct position of the centre of gravity. In other words, it's the balance point.

Dear Sir,

I have recently made a *Keil Kraft Competitor*, and I have a query on it. It climbs on power and dives on the glide, please advise me on this. I read the Aeromodeller every month and find it very interesting. I have made seven rubber powered models and my next attempt will be a glider.

Stevenage, Herts. *J. Horton.*

To trim your model for level flight, start with the glide. Pack the tailplane trailing edge up with shims of 1/32 in. sheet balsa and keep gliding it until a satisfactory glide path is achieved. Now if the model stalls badly under power, point the propeller downwards by adding packing behind the top of the nose block to create downthrust. Add or subtract until the desired flight is achieved under power. When trimming a power model, whether it be rubber or internal combustion engine powered, always treat the glide and power flight as two separate conditions.

Dear Sir,

Could you please send me instructions how to enlarge small scale plans and how to transfer to a full size plan. Please give the instructions as detailed as possible.

Co. Antrim, N. Ireland. *T. Hayes.*

Enlarging a small scale plan of say 1/72nd scale to a 30-40 in. wingspan flying scale model plan can be carried out in several ways. Briefly described these are direct enlargement with dividers and a ruler. Use of proportional dividers and ruler. Photo copy enlargement. The first method of enlargement with a divider and rule is easiest, draw out the datum lines i.e. wing/tailplane leading and trailing edge, and fuselage centre line to the scale you want, say six times larger than the small 1/72nd plan then fill in all the detail with dividers, working on straight lines where possible. Then scale the curves in, many of these will be free hand, so check them carefully by eye. Proportional dividers are pivoted in the centre and not the top, several pairs will be needed as they have a limited range of movement once set. These come in handy when you want to enlarge a 1/72nd plan by say 4½ times, as this is acomplished by moving the pivot point. Lastly and rather costly comes photo enlargement. All you need to do on the small scale plan is to mark a leading dimension to the final length you require it, i.e. just mark the wingspan as 40 ins. if this is what you want and the plan reproduction company will return you a plan enlarged to this size. The great advantage of this system is that all curves are enlarged very accurately and every part of the drawing is to the same scale. We can recommend the following company as they have enlarged plans for our own use. Plan Reproduction Co. (City) Ltd., 124-128, City Road, London, E.C.1. A fully detailed description of the above with illustrations is given in chapter three 'Scaling up the plan' of our book "Flying Scale Models" price 10/-.

Dear Sir,

When I took my Jetex 50 version of the *Keil Kraft Cub* glider to the flying field, I trimmed the glide right and put the Jetex into action. After about a five second flight, the plane crashed into the ground and burst into flames. Could you tell me why? I am very disappointed as it took me three weeks to make it. I am 11 years old.

Yeovil, Somerset. *T. Hunt.*

As you know, the Jetex engine works by a solid fuel pellet burning inside an alloy case and forcing a gas out of the jet hole at a high speed so propelling the model through the air. As the fuel pellet burns the alloy case gets extremely hot, enough to give a bad burn if touched soon after combustion. When your model crashed (possibly through not having the thrust lined up correctly) the hot motor casing must have touched your doped structure and dope being highly inflammable, it burst into flames. To stop this sort of accident you can cover the area around the Jetex engine with thin asbestos sheeting. This is being included in several makes of kit and is available at most good model shops.

Dear Sir,

I have a *Davis Charlton Quickstart Merlin* engine with Quickstart couplings. In an old Aeromodeller I saw a picture of my engine without the Quickstart couplings. I am wondering whether it would be possible to start my engine without the couplings. The Aeromodeller was dated May 1957.

Uckfield, Sussex. *A. Curd.*

Your engine will start very well without the spring and these can be removed if you like, but remember that you are removing something which is put there to make starting easier. Flick starting calls for a technique which rarely matches the speed of a spring-start.

How to Join . . .

To join, fill in the handy membership coupon and send with a postal order/money order or cheque to the value of 2/6d. made payable to "Aero Modeller". Post to Golden Wings Club, Aero-Modeller, 13-35 Bridge Street, Hemel Hempstead, Herts. Each member will receive his own badge —depicting "Golden Wings", a membership card, and two transfers to decorate his model or model box, and will make him a member of the largest modelling club of all time. **John Bridge**

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 badge, transfers and membership card.

NAME IN FULL .....

ADDRESS .....

.....

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

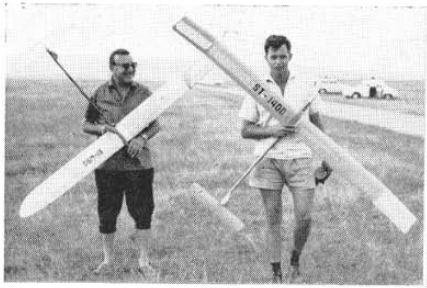
NAME OF ANY OTHER CLUB OR CLUBS TO WHICH I BELONG (if any) .....

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

Right: at the "Alpenpokal" in Austria, George Gastner holds his son Gunter's winning A/2 glider along with Hans Keinrath who was 2nd in the fly-off. Far right is Wolfgang Zach and Cox .09 FAI power winner. Below: First Rocketry International in Czechoslovakia, Ing. M. Jelinek of host country has just released his boost glide model from firing pad.

OPPOSITE

At the Yugoslavian "Euro-Apean Criterium" winner Alain Landeau at left was only one with perfect score. Center is Malina, who placed fifth with only diesel. And right is the Italian Power team.



..WORLD.....NEWS..

AUSTRIA, where Wiener-Neustadt's vast space was used for the annual "Alpenpokal" or Alp's Cup with the unusual requirement for everyone to fly A/2 *plus either* rubber or power. Joachim Loffler of East Berlin chose Wakefield and A/2, and was only one to fully max-out in Wake, came 10th in A/2 with 827, so was top scorer and winner. Local man Wolfgang Zach used Cox TD .09 to win power in a field of famous names and was only one with a perfect score. (Erno Frigyes lost his 4th flight and placed 10th). Five contestants scored 900 secs. in A/2, two W. Germans and three Austrians. Gunter Gastner of Nuremburg, a Junior flier, won in the 7th round with a 5 years old model, designed by Hans Beck whose own model was proxy flown to third place. Incidentally, Gastner's father was 13th.

HUNGARY. Hans Beck became World Champion in the Indoor class when he clearly won the Individual honours at Debrecen. Held in a hall belonging to the Lajos Kossuth University, the event was spread over 3 days with two rounds on each day.

The 3rd indoor World Championship was organised in Hungary after a four year pause, because the 1964 W/CH was cancelled due to insufficient entries. Although the flying area was much smaller than the Cardington hangar, the venue is obviously popular as 7 countries sent teams.

Actual flying site was a comparatively small place 92ft high and with the flying area about 65ft square. Around this there were three floors with balconies all around the flying area. It was really very interesting in that although there were a lot of people around the balconies watching or walking, the flying conditions were constant nearly all the time. Outdoor weather was very suitable, very hot with no wind.

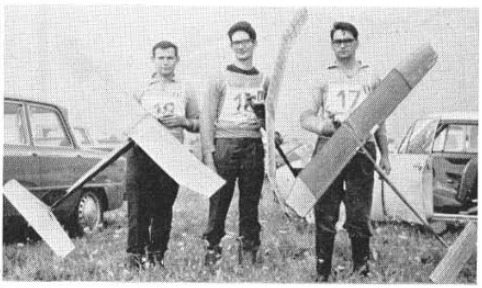
At a maximum, three models could be flown together, but mostly only two were flying with the third winding the rubber or in preparation. As usual, two best flights out of six were to count. Teams had their 'pits' at the first balcony.

The main problem for all competitors was to avoid touching the ceiling, to avoid descent down by the walls. All the U.S.A. team members made flights of over 20 minutes in the 1st round. Second place on the first contest day were, surprisingly, the Czechs with the only woman competitor in the event. Hans Beck from West Germany was the best, not only for the first day, but quite evidently so in the whole competition. He started with a 27:26 flight using a model to a K.H. Rieke design as for the 1962 W/CH, weighing less than 1 gr. (0.035 ounces). During the contest it landed on the floor 5 times out of 6 flights! Very often this model touched the ceiling, only to have the model improve its position in the flying area, while quite a lot of other models ended their flight at this point. Most unhappy man in "wall touching" was the veteran U.S.A. flier Frank Cummings. Only once did his models land in a normal manner! J. Kalina from Czechoslovakia also undoubtedly has a model which could fly for 30 minutes each time in the hall, but he also had the misfortune to contact the wall four times. The third man to fly for over 30 minutes was Joe Bilgri (U.S.A.) who often went no higher than 65 feet!—and still with some reserve power in his model. Other teams and individuals improved in second or third day, especially the Finnish entry, which, after a very bad start, was among the best at the end. The only entrant from Austria, Mr. Kohler, improved on every flight and up till the last round was in the third position.

The Hungarian hosts were very unhappy and had more than their share of bad luck although they know the site best of all. During the first four rounds their models touched the walls or finished somewhere at the ceiling. They improved very much in the last two rounds.

Five flights of over 30 minutes was really more than expected, especially when some of the well known and most experienced competitors were not present. The contest introduced names which in a very short time reached true W/Champs standard. One of them is of course new World Champion Hans Beck. He has concentrated only on a small National category of 35 cm span and has been working on the FAI class of indoor for only 4 months.

What will happen with indoor flying in future? This question was discussed at the unofficial meeting which was organised by the technical secretary of the CIAM of the FAI. It seems that the next W/CH in indoor will have more than 10 countries participating. All agreed that the ceiling categories for indoor are good and wish to keep these rules for the future. It was also recommended that the CIAM reduce the max. wingspan to 650 mm. for a better transportation and flying in smaller sites.



Individual results (22 entries) 1. H. Beck (Germany W.) 32:42, 32:12; 2. J. Bilgri (U.S.A.) 30:48, 29:35; 3. R. Hyvarinin (Finland) 27:14, 26:59; 4. J. Kalina (Czech) 30:46, 23:09; 5. P. A. Romak Jr. (U.S.A.) 27:51, 25:30; 6. M. Koller (Austria) 27:13, 25:52; 7. Z. Ocsody (Hungary) 27:52, 24:57; 8. E. Hamalainen (Finland) 26:12, 24:40; 9, W. Strattner (Germany W). 25:08, 23:07; 10. G. Varszegi (Hungary) 24:02, 24:00.
Team results. 1. Germany West, 2. U.S.A., 3. Finland, 4. Hungary, 5. Czechoslovakia, 6. Yugoslavia, 7. Rumania.

There are two countries interested in organising the next indoor W/CH in 1968, Austria in a sports hall in Vienna, or Rumania in a very large hall in a salt mine 330 ft below ground.

YUGOSLAVIA, Scenic tourist spot Lesce Bled attracted 21 competitors from eight countries, for the 12th European Criterion for free flight power models on 20th July.

For the first time in this event, the competitors used standard fuel for glowplug engines according to the decision of the CIAM in 1965. Performance was limited, but not so much as was expected. Though attendance was less than before, the competition was very strong as we find among the entrants many top fliers—E. Frigyes from Hungary, F. Schneeberger from Switzerland, V. Hajek and Malina from CSSR, V. Kmoch from Yugoslavia, and George French, John West and Dave Welch from G.B.

Calm, rainy conditions prevailed, and thermal activity proved almost unpredictable.

Models were mostly the old ones from the 1965 events and engines were mostly Super Tigre. Only the winner used the new Cox Special MkII glowplug engine, and Czechoslovakia and Hungary used their own MVVS and MOKI engines. Malina used the new MVVS 2.5 T/R Super modified from the old MVVS 2.5 RL glowplug unit.

This was to be the last time the contest is organised in Bled. In future it will be near Belgrade and at Bled there will be a multi R/C international contest, which will surely become very popular due to the attraction of the wonderful surrounding country in this part of Yugoslavia.

Individual results (22 entries) 1. A. Landeau (France) 900, 2. V. Hajek (Czech) 893, 3. L. Bisak (Yugoslavia) 882, 4. A. Metzner (Hungary) 873, 5. Z. Malina (Czech) 868, 6. A. Schneider (Czech) 838, 7. R. Schenker (Switz) 838, 8. F. Schneeberger (Switz) 837, 9. J. West (G.B.), 831 10. V. Kmoch (Yugoslavia) 805.
Team results. 1. Czechoslovakia, 2. Yugoslavia, 3. Switzerland, 4. Hungary, 5. England, 6. Italy, 7. Austria, 8. France.

CZECHOSLOVAKIA. This historic first-ever contest for model rocketry was organised on the 28-29th May, 1966 in Nova Dubnica under the patronage of the Czech Adast factory which produces RM 2, 5/5 model rocket engines.

This event was flown to the provisional FAI rules and became really international as 7 countries sent competitors or observers. There were full teams of 8 competitors from U.S.A. and some from Poland, E. Germany, Hungary, Bulgaria, Yugoslavia, and of course about 30 competitors from the host country.

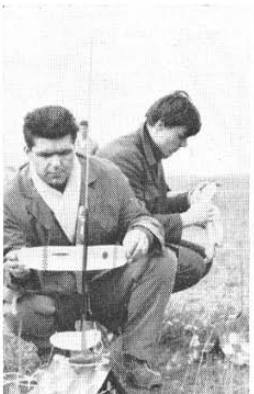
All rocket engines intended for use during the competition were tested. Only engines within the first FAI category with a max. total impulse of 5.0 New/sec. were allowed in the contest. Factory made engines from U.S.A. and the ADAST engines from Czechoslovakia, plus others from Poland, Bulgaria and Czechoslovakia not yet in mass production were in use.

Cold weather with strong wind and showers affected all contest days.

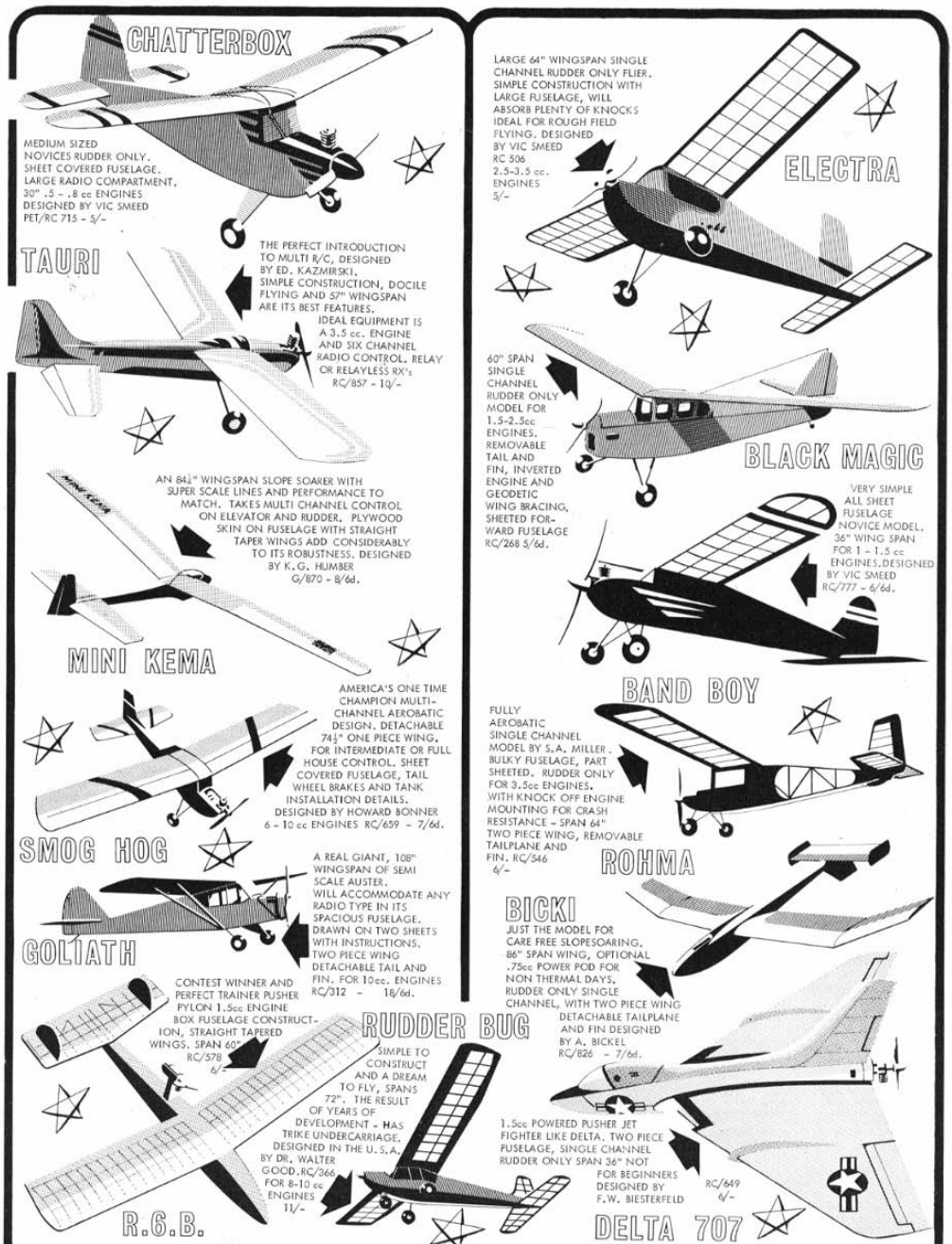
Payload was flown first. Ten participants reached more than 650 feet height. First four places went to the U.S.A. team which employed excellent tactics by using different types of engine for each flight.

The *Boost-glide* competition was the most interesting event of the whole contest. This category calls for a gliding recovery and seems to be the most difficult of all rocket categories. Two different approaches appeared. The U.S.A. team used *Boost*-gliders, specially made for a very good climb. Czechs used boost-*Gliders* with much better glide. The main difference was in the size of the models. U.S.A. prefers very small models; the Czechs used something similar to hand launch gliders. The rules require that the competitors use only one model for the whole contest and that the model must be returned and shown to the jury within one hour after the start. This made the event very exciting as recovery could be hazardous. Four first places went to the Czechs.

Parachute duration also had a great success. Bigger the parachute used, greater the time achieved, but also a very long distance between the start and landing point. As the model must be back within one hour, recovery is very important. A river near the airport in the down-wind direction proved to be the greatest obstacle in this race.



Right: M. Kacha prepares typical Czech boost-glider entry, more on chuck glider lines. Centre is one of O. Saffek's scale rockets at launching. Other scale types on the pad were in special demonstration. Right, Payload event winner, J. T. Guill, reached height of 790 ft.



SUNDAY FLIER RADIO CONTROL SPECIALS

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Early "Solids"

Dear Sir,

Many thanks to Mr. Capon for his interesting letter in the July issue and to you, Sir for publishing it.

I started modelling in 1917, using 1/48th scale as that was about the same as W. Britain's smaller soldiers but most of my dimensions were guesswork until the end of the 1914/18 war.

In April 1918, "Flight" published details of the Sopwith Triplane from a German source with dimensions in metres, and I set about converting them, but as I was not very bright at school the results varied at almost every attempt.

One or two of my friends also started modelling and we formed a Wing of three squadrons. I 'bagged' No. 39 as their Headquarters was at Woodford, where the remains of SL.11 and L.31, the Potters Bar Zeppelin, had been dumped.

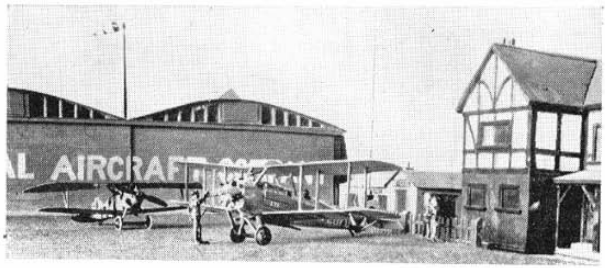
My pocket money was small in those days and so thin carboard was used for construction. Various improvements were introduced, including a system of layers of paper with bulkheads, for oval fuselages. Some propellers were made from a piece of a 44 Squadron Camel propeller which finished up in the hedge bordering Hainault Aerodrome. They often did that in 1917-18. Luckily I was usually there to get in the way afterwards. The R.N.A.S. Fairlop aerodrome was round the corner, about 10 minutes walk away, and the aeroplanes to be seen there were more varied. I saw there my one and only Nieuport 17, and F.E.2.D which when taking off facing the hangars just cleared them with its elevators very much up.

About 130 models were built by the "Regal Aircraft Factory" (from my name Reggie Allan) and wooden pilots were made to fit into the cockpits and when a 'bus' (aeroplanes were often referred to as 'buses' in those days) took off from the aerodrome, a log of the flight was completed afterwards. I still have some of them. I used to walk about with an aeroplane in my hand after dusk in various parts of the district, (I must have been barmy), and according to one Log, Lt. Lobb (old R.F.C. rank) flying a Fairey Fox, was attacked by a "woolly brown 'bus' worrier". Actually a dog, probably thinking I had a meat bone in my hand. The attack was repelled by a burst of verbal machine gun fire, (thats not in the log). An Aerial Derby and other races were often held,

During the air raids of 1917-18, machines sometimes took-off from Hayfleet Aerodrome to repel the raiders, indoors of course, and on occasion some members of the family have recieved a face full of model aeroplane as they entered a room in the black-out.

I am retired now, from working in a bank, and have plenty of time to indulge in making up the odd plastic kit now and again, but I still have some of my original models, and have renovated or renewed some using plastic parts here and there, but my modelling came to an end just about 1930 when the "Xactus" D.H. Moth kit was introduced, followed by those of "Skybirds" 1/72nd scale. Hayfleet and Allandale Aerodromes are now no more, and Log Books are no longer completed.

South Woodford. *R. S. Allan.*



Above, Reg Allan's 1/48th Aerodrome

Readers' Letters

Fly-off controversy

Dear Sir,

As one of the timekeepers in that controversial Glider fly-off at the Nationals, I would agree with the remarks in the August Aeromodeller—this was not a satisfactory way to finish a contest. I know that I tried to give a fair judgement (despite the "backchat patter" of the "bod" behind me who, I discovered after stopping the watch, was making good use of a pair of binoculars). My eyesight is excellent and yet "my" competitor finished well down the list, which leads me to suppose that the general interpretation of 'a fair judgement' leaves much to be desired.

Surely there must be some better way of finishing a contest in these circumstances. It is not possible to introduce some ruling to prevent a re-occurance of this "farce"? My own suggestion for regulating fly-offs would be this: that some person or persons in charge of running the contest should decide before (or possibly during) the fly-off a time beyond which there exists reasonable doubt about the ability of the timekeepers to return an accurate result. This time would be given to the nearest minute and all competitors achieving the maximum would be judged "equal first" and so share any prizemoney (Trophies would be unpresented).

To turn to a related topic covered by your editorial, can I say that my own Club tried to play its part in the organisation of the Nationals through local advertising and displays, by offering (without reply) the services of its members to the SMAE, by providing officials, and by helping to clear up the aerodrome afterwards. But throughout all, the voice of the central control was very faint. If more volunteers are required to run the "Nats", it seems most reasonable that they should come from the local area, and I suggest that the SMAE should therefore make a more intimate appeal to the "host" area than it apparently did on this occasion. Can it be that the SMAE has been 'bitten' doing just this at some time in the past?

Swindon, Wilts. *M. G. Chaplin.*

Dear Sir,

As I have neither built nor flown contest models for the past ten years I probably seem unqualified to comment on a current situation although, before I gave up modelling for business reasons, I was a keen A/2 flier with considerable contest experience.

I was interested to read John O'Donnell's piece in your August issue regarding the "fly-off" problem about which he expressed concern. His closing words rather suggested that some form of performance penalty might be the undesirable yet only answer.

Surely there must be avenues of exploration still?

One thing which, it seems, hasn't changed since I last flew in contests is the luck element. Given the best still-air performance in the world, thermal conditions can make a mockery of the most highly qualified flier and luck, good or bad, continues to play a big part in "who" places "where" in any free flight contest.

If this can be accepted, as it surely must, then would it be any harder to accept alterations either in the pattern or the rules of flying?

One could, for instance, consider cutting down the number of rounds in a contest, at the same time perhaps, increasing the "max". This would get the rounds over more quickly leaving more time for any necessary fly-offs, and no doubt lighten the burden of the officials.

Another alternative would be to confine flights to within the airfield boundary, the aim being to put up the highest time within the confines of the field and penalising those whose models D/T outside.

Yet another suggestion is that an example be taken from full size gliding contests where the course for the day is decided upon according to the weather conditions prevailing. This is brought to mind when recalling some model aircraft events when conditions were so good, one could, with lift, achieve the highest score without chasing a model too far. On other days one could lose a model down wind, returning only a very low O.O.S. flight time.

Perhaps then one should have flexible contest rules which could be altered according to flying conditions on the day.

I realise that these suggestions, and any others too, would need the greatest deliberation in order to cover fully all the many facets but would reduce the "challenge" of contest flying in any way.

Allesley, Coventry. *J. K. Rogers.*

Polish numbers. 2017, 1217 etc.
Style as Type 'D' below

0201

Czech number black 0004, 0201, 0202 etc.

Russian numbers. 64-68 etc.
Red with thin black edge

No numbers on nose of Indian aircraft - See Sheet 2 for rudder markings.

Russian insignia.
Red star with white edge.

Polish insignia.
Red and white
Position as Type 'D'

Black edge
Blue
White
Red
Czech insignia

65

"FISHBED - C"

Undercarriage detail as Type 'D'

Dk. Grey

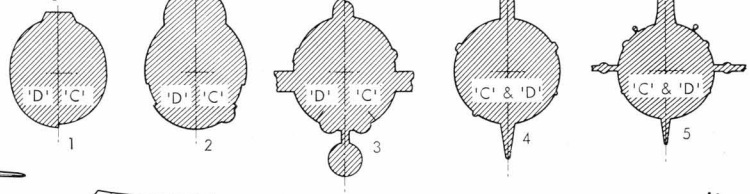
Position of Polish insignia on "C" Type fuselage

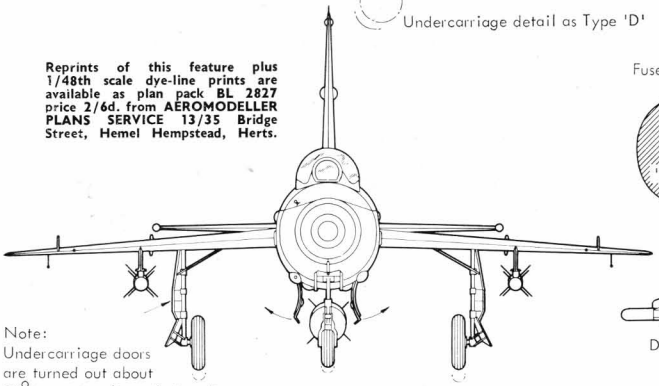
Dk. Grey

Position of Indian roundel

Reprints of this feature plus 1/48th scale dye-line prints are available as plan pack BL 2827 price 2/6d. from AEROMODELLER PLANS SERVICE 13/35 Bridge Street, Hemel Hempstead, Herts.

Fuselage Sections





Note:
Undercarriage doors are turned out about 30° to centre-line of aircraft.

Detail 'Atoll' rocket and rail

Polish numbers 404-418, 1606-1615 etc.

406

Nose cone Dk. Red

"FISHBED-D"

Drop tank yellow on some Polish aircraft incl. 406

Dk. Grey

Dk. Grey

1 2 3 4 5

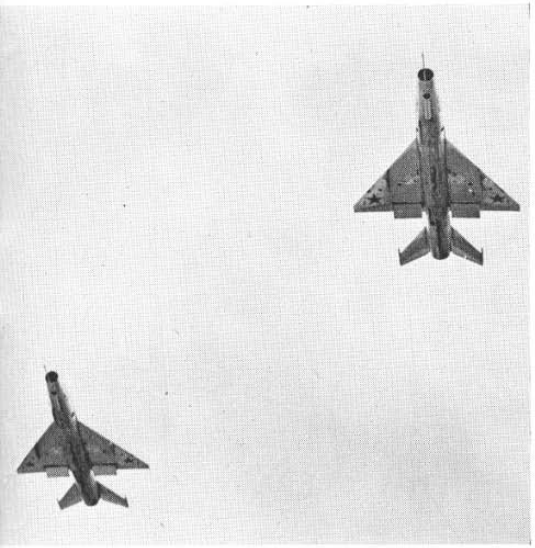
Traced by A.A.P. Lloyd

Drg. by Ian R. Stair

MIG-21 NATO CODE-NAME FISHBED

SHEET No. 1 ELEVATIONS

SCALE 1/48



THE tailed delta shape of Mikoyan's Mach 2 interceptor is now as familiar a sight around the world as the widely used Hawker Hunter. Indeed for some Air Forces it has become a top cover aircraft if not a successor to Hunters. Twelve Nations use the MiG 21 outside the borders of the U.S.S.R. and in several cases the type is a stablemate for British and American products. In Finland it serves with Gnats, in Iraq with Hunters, India with Gnats and Hunters, Yugoslavia with Sabres and Thunderjets and of course it is very much in current news as a formidable opponent for U.S. Forces in Vietnam.

First appearance in 1956 at a Soviet Aviation Day display led to initial confusion with the Sukhoi fighter, now known as "Fishpot". A variant was identified as the E-66 and this established a World Record of 1,484 m.p.h. in 1959 and 113,892 ft. altitude in 1961. Such performance, even though with special preparations obviously reflect on the excellent aerodynamic qualities of the MiG 21. It has been referred to as an aircraft with little evidence of design compromise, yet it has its own limitations. The short range, improved in some cases by replacing the weight of one cannon by extra fuel, engine restrictions and clear-weather requirements have limited the capability of the standard "Fishbed-C".

An improved version, the "D", has enlarged intake and improved radar as well as a faired canopy and all-missile armament. It is in service with the Soviet Air Force as well as Polish, East German and Czechoslovakian Air Forces.

AIRCRAFT DESCRIBED Number 155
Mikoyan/Gurevich MiG 21

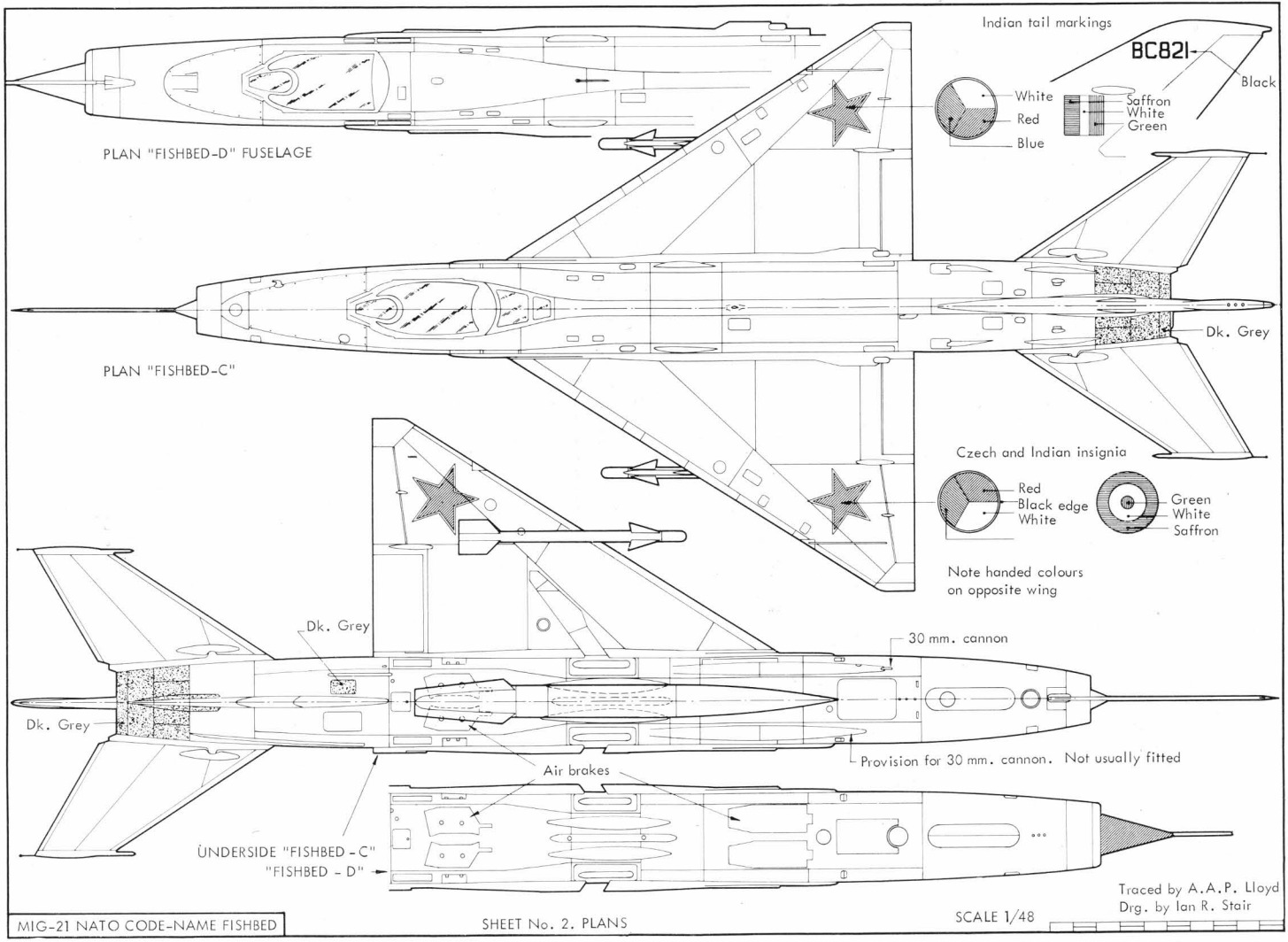
Plans to produce the MiG 21 "Fishbed-C" in India were finalised in 1963. A few were delivered at a cost of approximately £¼M each and the early loss of two in a mid-air collision together with charge and counter charge relative to the qualities of the aircraft led to many expressions of doubt that licence construction would actually proceed. The Minister of Defence of India confirmed that Mig 21 airframes are to be made by Hindustan Aeronautics at Nasik, Bombay, and the TDR Mk. R 372 Turbojet at Karaput. This jet is rated 9,500 lb. static thrust (drv) and 12,500 lb. with afterburner.

Normal armament is 30 mm. cannon plus two "Atoll" air-to-air missles. These are similar to the "Sidewinder". Underneath the fuselage a pylon supports a ventral tank or other external store.

One of the features of the MiG 21 is its forward hinged canopy for a semi-capsule ejector seat mechanism, and the use of the large flaps at the trailing edge as well as four air brakes. It was planned for rough field operation and in demonstration, has used both auxiliary rocket and JATO aid for take-off in limited areas.

The shape is destined to become more familiar since it has been developed into the MiG 23, a twin-jet interceptor of improved Mach 2.5 performance, now in service in the U.S.S.R.

MiG 21s of Sov. A.F. display their shape in these two photographs. Although many pictures of the "Fishbed" C & D versions have appeared in the Polish aviation magazines, we regret that we find it impossible to obtain copies suitable for reproduction, Foreign editors please not, F-111, Lightning 6, TSR-2 photos available for swopping !



Traced by A.A.P. Lloyd
Drg. by Ian R. Stair

MIG-21 NATO CODE-NAME FISHBED

SHEET No. 2. PLANS

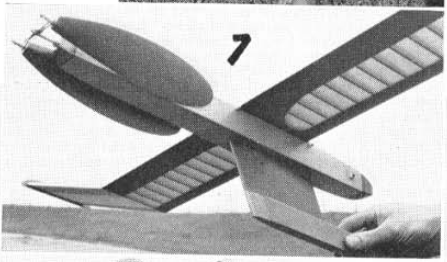
SCALE 1/48

N. W. Woodford Rally

1. In the Open Rubber contest fly-off was Jim Clements, now re-instated the 1966 "Gamage" Cup winner following SMAE Council decision to accept results received late. 2, is open Glider winner with fly-off time of 3:03, Howard Wood, of Ashton, who flies an APS "Sans Egal" wing on own design fuselage and tail. 3, is our columnist John O'Donnell's chief contender in the Championships stakes, Ray Monks. with Cox TD 15 powered winner of Open Power with 5:23 fly-off time. 4, Walsall's Bob Ivans has completed his Junkers JU 88A4 with one Glo-Chief and a Johnson 35. Has retracting U/C, flaps, dive brakes, throttles, bomb releases, was first flown in the contest at Woodford! 5, "Miss Aeromodelling" at Woodford. Lynda Pearce with Derek Brunt's Goodyear pylon racer which placed 3rd in the event. Nice work, Derek! 6, Tailless winner D. Parker, Secretary of Midland Area and from Rolls Royce Club, with his modified "Sparrow". Has inverted Hoerner tips, weighs about 14 ozs. uses parachute D/T. 7, Jim

Pic Page

McCann, of Tynemouth, flew a high thrust line Wakefield employing power model principles. Has 14 strands 6 x 1 Pirelli to drive 20 x 20 in. double blade folder prop for powerful 20 second run. Model performs well. 8, Radio winner D. Read, of Rolls Royce, and his Citizen-Ship equipped "Taurus" with Merco 61. 9, First and second in Rat Race were Mike Allen (left) and Tom Jolley. Left model is powered by K&B 40 series 66 with Grish 9 x 8 prop., is 30 in. span, weighs 24 ozs., other model as Fox 35 needle bearing Combat special. 8½ x 8 prop, 28 in. span each uses a Merco silencer. Team interchanges to make two entries, had to find proxies when both qualified for final. 10, Henry Tubbs placed 3rd in Tailless, seen here stringing his motor—ooh those fancy tips!



Contest Calendar

September 18 *South Midland Gala*. College of Aeronautics, Cranfield, Bedfordshire. All classes F/F, C/L, R/C, including Coupe d' Hiver (R.O.G.) and Chuck Glider. Except Speed, B T/R and Scale. Pre-entries to:- T. Payne, 7, Silverdale Road, Northampton.

September 24 and 25 *R.A.F. M.A.A. Championships*. R.A.F. Hullavington, Wilts. Wakefield open to civilians on 25th.

September 25 *Luton D.M.A.S. Slope Soaring Rally*. Ivinghoe Beacon, Multi and Single R/C. F/F Chuck Glider. Write to D. Bateman, 14 Ridgeway Drive, Dunstable, Beds. Please no power models.

September 25 *N. Area Meeting*. R.A.F. Topcliffe, Tony Pennett Memorial Trophy for open power, also vintage, Coupe d' Hiver and A/I glider. Details from D. Wiseman, 34 Burton Stone Lane, York.

September 25 *Novocastrian Control Line Rally*. R.A.F. Thornaby on Tees, Co. Durham. A Combat, ½A, F.A.I., B T/R. Pre-entry 3/- to:- S. Peart, North Farm, Throckley, Newcastle-on-Tyne 5.

October 1 & 2 *S.M.A.E. 1st Free Flight Trials*. Everleigh, Wilts. **Were to have been on October 8 & 9th.**

October 9 *S.M.A.E. Southern Gala*. R.A.F. Odiham. Open Rubber (Flight Cup), Open Glider (Pilcher Cup), Open Power, ½A Power Quickstart Trophy), Chuck Glider, R/C Multi (Aeromodeller Trophy), 9A and F.A.I. Team Race, Combat. **Was Oct. 2nd.**

October 9 *South Bristol Autumn Gala*. R.A.F. Hullavington, Combined R/G/P vintage event, models prior to 1/1/51, Power 15 secs., R.O.G. Rubber R.O.G. Glider 250ft. line all 3 x 3 mins. All in F.A.I. Event 3 x 3 mins., Coupe d' Hiver and Chuck Glider.

October 9 *Glenrothes Control Line Rally*. Pitreavie, Nr. Dunfermline, Combat and Rat Race. Pre-entry to:- W. Watson, 8 Lomond View, Glenrothes, Fife.

October 9 *Cotswold R/C Soc. Proportional only Rally* Morton Valance airfield, 6 miles from Gloucester, on A.38. Spot landing, Aerobatics, Pylon Race. Pre-entry 2/- to:- R. F. Street, 121 Ryelanch Road, Stonehouse, Glos.

October 9 *Canterbury Pilgrims Gala*. Club flying field at Barham, Nr. Canterbury, Kent.

October 16 *South Coast Radio Control Rally*. Golden Gross, Nr. Lewes, Sussex,. Single, Multi and Scale events. Details from N. F. Couling, 7, The Green Walk, Willingdon, Eastbourne, Sussex. (S.A.E. please).

October 16 *Midland Area Rally*. Wellesbourne Mountford Aerodrome, off B.4085, east of Stratford on Avon. R/C free style, Open R/G/P, Chuck Glider, Tailless (250 ft. line), 30 sec. power, Coupe d' Hiver, Combat, ½A, F.A.I., Team Race, Handicap speed possible, R/C impromptu pylon. Pre-entry R/C, Combat & Team Race, 2/6d. to:- D. Parker, 38 Harrogate Crescent, Broadsall Estate, Derby.

October 16 *Imperial College Control Line Rally*. Sipson Lane, Harlington. A Combat and B Rat Race. Pre-entries to:- I. Kaynes, 11, Parkside Road, Sunningdale, Berks.

November 5/6 *S.M.A.E. Second Free Flight Trials* probably R.A.F. Topcliffe, **was Everleigh.**

Coming Events

November 20 *Welsh Rally*. North Cefn-Bryn Common, on B4271 off A4118 from Swansea. Open R/G/P and Chuck Glider.

NOTE **S.M.A.E. NORTHERN GALA NOW CANCELLED**

North Western Area Woodford Rally.

Reported by John O'Donnell

NOW once more an annual event, following relaxed security at Hawker Siddeley's Woodford aerodrome, this popular meeting was held on 31st July. Although the rally was undoubtedly successful the organisation did not have its usual efficient look, and appeared to be suffering from a manpower shortage. There was a noticeable lack of clubs willing to run events. Free-flight had a very casual appearance—much like a small and informal gala—whilst other events were run almost single handed by Area Officers. The subject of car parking is probably best left without comment.

A dismal morning preceded a few heavy showers around mid-day and early afternoon and must have severely curtailed *public* attendance. Nevertheless enough came to render the meeting financially sound. Paradoxically, flying conditions were well nigh perfect. There has never much drift, and at times none at all. In free-flight, max's were commonplace even in the most unlikely events. D.T. failures led to some very long flights that still landed within a few hundred yards. These included 27.27 by Alan Moss with a F.A.I. power model, and 51 minutes by Dave Glue's glider. Not so lucky was Roy Roberts who lost a chuck glider *upwards* after half an hour.

The chuck glider event itself was won by Doug Barber with a 2:23 and two max's losing two models in the process. Next was D. Brown with three amazingly consistent flights of around 2:30. Tailless also had its share of max's, two going to winner Derek Parker flying a large glider. Rubber exponents John Pool and Henry Tubbs followed.

All the other free-flight events were decided on flyoffs—the organisation of which would have been easier with a P.A.

Continued on opposite page

CLUB & CONTEST NEWS

EAST MIDLAND SPEED COMBAT RALLY,

Held on July 17th at R.A.F. Barkston Heath the East Midland Area S.M.A.E. Speed and Combat was marred by early weather conditions but things improved in the afternoon. Combat attracted 36 entries and flying was of a good order with prangs and lots of attacking going on. Mad Macs came down from Scotland but did not manage to take the pots home with them, and the Outlaws combo of Pete Smith and Mike Davies were all knocked out in the second round, though their design the *A.P.S. Dominator* was definitely the most popular model there. The final brought together V. Hunt (Heanor) and G. Shaw (F.A.C.C.T.) but was damped down by V. Hunt doing a slow model change leaving G. Shaw to win. Out of 12 entries only seven recorded times in Speed with Mike Billinton first away to record 161.2 m.p.h. using his small metal winged mono line model, powered by a Checksfield Dooling .61. Ivor Roffey then recorded 165.7 m.p.h. with the model shown in September Aeromodeller, "Silencers and Noise". This model, although larger than an F.A.I. model really goes and if Ivor would not persist in putting his elbow in the pylon instead of his wrist he could have decreased his radius of action by 2 ft. and gained a substantial increase in airspeed.

South Coast Gala Rained Out

Poor weather conditions well and truly put paid to all the effort that went into the organisational side of the South Coast Gala and this the first to be held on an airfield for five years, at Tangmere on July 24th. Starting dull with a keen wind followed by drizzle and then torrential rain, even the hardiest of fliers were rather put off. *F.A.I. Team Race* was not flown at all, as none of the entrants wanted to risk their models. ½*A* was flown and this was a Feltham-Hayes benefit. In one all-Feltham/Hayes heat, S. Kirbys' model ballooned-in on take off and his lines wrapped around Jackson who gradually became more tightly bound untill he had wound Kirbys model right into the circle centre and onto his waist. Helpers had to rush in and carry the model around with him whilst Dave Balch hacked away with blunt wire cutters. Smith/Brown made a 4:09 (over 5 miles) in the 2nd round but had to retire in the final. Eventual winners were Dell/Fry at 9:02.5 for the double distance final. *Combat* saw several big names knocked out, among them Richard Wilkens' *E type Early-Bird* just exploding in mid-air when Chris Pike flew right through it! After the third round the event was cancelled and a draw taken for the prize money. Third man in the draw was Norwegian visitor A. Ytreoy who designed the *A.P.S. Streamer Eater*. He has been staying in England with Stoo Holland of Northwood. *Stunt* was blown out and all flights were understanderbly ragged, Jim Mannal scoring several threes and fives with his Merco .35 Crusader. M. Mayne of Lee Bees put up the best show with a "*Sterling Skylark*" kit model also with Merco .35. Over at the *Radio Control* area the six *Multi Aerobatic* competitors were having a hard time with the elements. P. Wingate eliminated himself by trying a bunt too low, and C. Baker with a Flight Link propo model missed out five manoeuvres. Hardly any model would spin or slow roll and no real tailslides were seen. Most loops were poor and bunts good, Paul Rogers did not attempt a spin and Ed. Johnston made a poor spin entry. N. Butcher improved in the second round and his neat model box with built in pump and starting battery could be copied by other contestants, who are often seen struggling with odd bits and pieces. Derek Hammant made a landing that was admired by all present for its smoothness under the conditions. Ed. Johnson took top spot with 2076.5 pts. and Paul Rogers second with 2001. The *Open Pylon Racing* only had four entries, and all these were aerobatic models no Goodyear types. In the strong wind the red and white check pylons kept blowing over, so they were laid flat and Messrs. Butcher, Rogers, Johnson and I. McLennon flew three heats two up, to give Paul Rogers a win and Ed. Johnson second.

System. Glider was first away, which was just as well in view of the outcome. Howard Wood had a clear win by dint of flying early in lift so weak that no-one tried to join him. Second place was a three way tie at 2:33!! The F.A.I. flyoff was "doubled up" with glider by Dave White and myself, whilst Martin Dilly made his F.A.I.—only flyoff at about the same time to squeeze in between us.

The rubber flyoff soon followed and several models climbed nto the same thermal. Top two places (Gerry Tideswell and H. Worthington) were taken without D.T.'s—whilst Dave Morley D.T'd himself down to fourth place, just below Ray Monks. Ray was having a good day as he went onto win the power flyoff by a clear two minutes. No-one else found helpful air and resultant scores were quite close. The second glider flyoff (for second place) also took place at this stage. Dave Glue found good air to "win" whilst the disappearance of my model behind obstructions settled matters between Bobbie Howarth and I.

A quick cycle ride round the non-free-flight events in late afternoon provided partial photo-coverage, but was not enough to report happenings in great detail. The R/C Multi event, won by D. Reed's "Taurus" with Merco 61 and the new Digital 5 Citizenship equipment, had one flight cut out due to time lost by rain, and needed by the Goodyear pylon event. This latter event has already been found to possess one severe snag—the number of people needed to run it (one timer plus one flag-waver per pylon being needed for *each* model). Initial results showed a tie for first place but there was apparently a flyoff with G. Franklin having a few seconds lead over Barry Purslow.

The combat event was run believe it or not, by visitors from Scotland. They had been critical of an earlier N.W.A. event and had offered to show how it should be done. As there was lack of an enthusiastic "home" club the Scottish offer was accepted. The *English* winners proved to be Hunt of Heanor and Pete Heywood of Whitefield.

I cannot say much about the Teams Race except that one heat made very short work of demolishing one of Joe Savini's F.A.I. power models that descended into the circle. The team racer did not even falter! The result of the ½A race would appear very close, and I can only hope that the *position* of the models on the last lap agreed with the recorded scores, which were within 1/10 second in 9 minutes. An accuracy of 1/50 of a percent is rather optimistic.

Rat race had an interesting situation as the Tom Jolley/Mike Allen team qualified for the final with *both* their models.

By having one flown proxy they managed to take first and second—by virtue of reliability and good restarting as neither was the fastest model in the final. Their self-flown winner had a K & B 40 series 66 with a Grish 9 x 8 nylon prop and Merco silencer, whilst the proxy flown model had a Fox 35 needle bearing Combat Special and similar accessories.

Bob Ivans won C/L Scale with a Junkers Ju 88, making a good job of the proverbial "first-flight-ever" in the contest. This, he hastened to explain, was due solely to his Potez 63 being reserved for the World Championships.

The overall (f/f) gala championship proved a very close match between Ray Monks and myself. On the "normal" events I had 20 seconds lead but discovered about 15 minutes before finishing time that Ray had flown chuck glider as well! There was not time for much except to "chuck" one of my A/2's. I was just about getting the technique right when I ran out of time. Another flight like the last would have done it! Such is the price of reporting and photographing!! The junior championship result was not announced at the contest but was won by Peter Oliver flying glider and F.A.I.

The events were followed by a prize giving held, in view of yet another shower, inside a marquee. The awards were presented by "Miss Aeromodelling 1966" (Lynda Pearce) in the presence of a rather larger gathering than usual.

N.W. AREA WOODFORD RALLY 31st July 1966

Rubber [fly-off times] 45 entries 1. G. Tideswell [Baildon] 9:00+13:07 2. H. Worthington (Wallasey) 9:00+12:17. 3. R. Monks (Birmingham) 9:00+11:40. 4. D. Morley (Lincoln) 9:00+11:14. **Glider** (fly-off times) 77 entries. 1. H. Wood (Ashton) 9:00+3:03. 2. D. Glue (Brighton) 9:00+2:33-2:41. 3. R. Howarth (Whitefield) 9:00+2:33+2:15. 4. J. O'Donnell (Whitefield) 9:00+2:33+2:09. **Power** (Fly-off times) 1. R. Monks (Birmingham) 9:00+5:43. 2. N. Martingdale (Wallasey) 9:00+3:43. 3. D. Miller (Cambridge) 9:00+3:30. **All-in F.A.I.** (Fly-off times) 27 entries.1. J.O'Donnell (Whitefield) 15:00+2:33. 2. M. Dilly (Croydon) 15:00+2:16. 3. D. White (York) 15:00+2:12. **All-in Tailless** 8 entries. 1. D. Parker (Rolls-Royce) 7:41. 2. J. Pool (York) 6:45. 3. H. Tubbs (Baildon) 6:32. **Chuck Glider** 30 entries. 1. D. Barber (Leyland) 8:23. 2. D. Brown (Potteries) 7:26. **R/C Multi** 1. D. Reed (Rolls Royce) 2729 pts. 2. E. Johnson (Buccaneers) 2628 pts. 3. T. Cooper (Sutton Coldfield) 2582 pts. **R/C Pylon** 1. G. Franklin (Larks Leicester) 3:21 2. B. Purslow (LARCAS) 3:25 3. D. Brunt (Larcas) 3:50. **Free Flight Scale** 5 entries 1. H. Yates (Wharfedale). *Gloster Gamecock*. 2. I. James (Walsall) *Morane Saulner*. 3. A. C. Cummins (Chester) *Sopwith Tabloid*. **Control Line Scale** 6entries 1. R. Ivans (C/M) *Junkers 88*. 2. H. Carter (Tamworth) *Hawk P'shaw* 3. G. Hayes (Sharston) *Tempest*. **Combat** 67 entries 1. Hunt (Heanor) 2. Heywood (Whitefield) 3. Dixon and Flanagan. **F.A.I. Team Race** 36 entries 1. Balch/King (Feltham) 10:02. 2. Salmon/Royle (Priory) 11:17 3. Place/Howarth (Wharfedale) 92 laps. **½A Team Race** 28 entries 1. A. Dell (Feltham) 9:01.4 2. Place/Howarth (Wharfedale) 9:01.53. S. Smith (Feltham) 9:15.2. **Rat Race** 35 entries 1. T. Jolley/ M. Allen (Whitefield) 7:29. 2. M. Allen/T. Jolley (Whitefield) 8:39. 3. Smith/ Bradley (Feltham) 8:47 **GalaChampionships** (Senior) 1. R. Monks (Birmingham) 42:06.2. J. O'Donnell (Whitefield) 41:57. (Junior) 1. P. Oliver (Whitefield).

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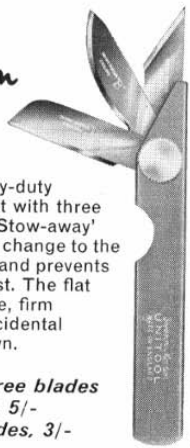

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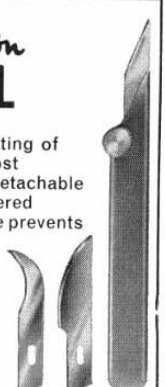

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