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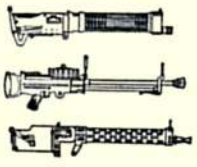

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8 x 6	6/11	7/3
8 x 8	6/11	9/11
9 x 6	8/6	9/11
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52" span

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For motors of .23 up to .40 cu. ins. (3.7 to 5.6 c.c.). The first in a long line of immortal Hawker Fighters, the only one with identical planform top and bottom wings – just build 2 wings – and cut the ailerons in the lower wings.

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Aero Modeller

INCORPORATING
MODEL AIRCRAFT

April 1971 Volume XXXVI No. 423

CONTENTS

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COMMENT

Royal Air Force Hullavington is yet once more opening its gate to all aeromodellers at Whitsun for the Annual National Championships. Such hospitality is all the more appreciated by those who know the long and sorry story of attempts by S.M.A.E. Officers to obtain a change of venue. Although the feeling was amicably mutual in both the R.A.F. and the S.M.A.E. that 1971 was time for a move, each approach to alternates in the Midlands and Eastern areas of the country proved fruitless. Siting any future 'Nats' will present many problems; but for this year Hullavington (once more) has come to the rescue. It's now up to the modelling fraternity to show its appreciation.

on the cover

Pat March's novel metallised paper covered Seversky Lancer and D. Wyatt's conversion of a Guillow FW 190 kit for Round the Pole electric flying as seen at the Model Engineer Exhibition.

next month

More Free Flight by Eric Coates plus a plan for a **Thomas Morse S4C** Scout biplane fighter. **Coupe d'Hiver** International report, **Control Line stunt** manoeuvre changes described and **Engine Test** plus many other great features. On sale April 16th.

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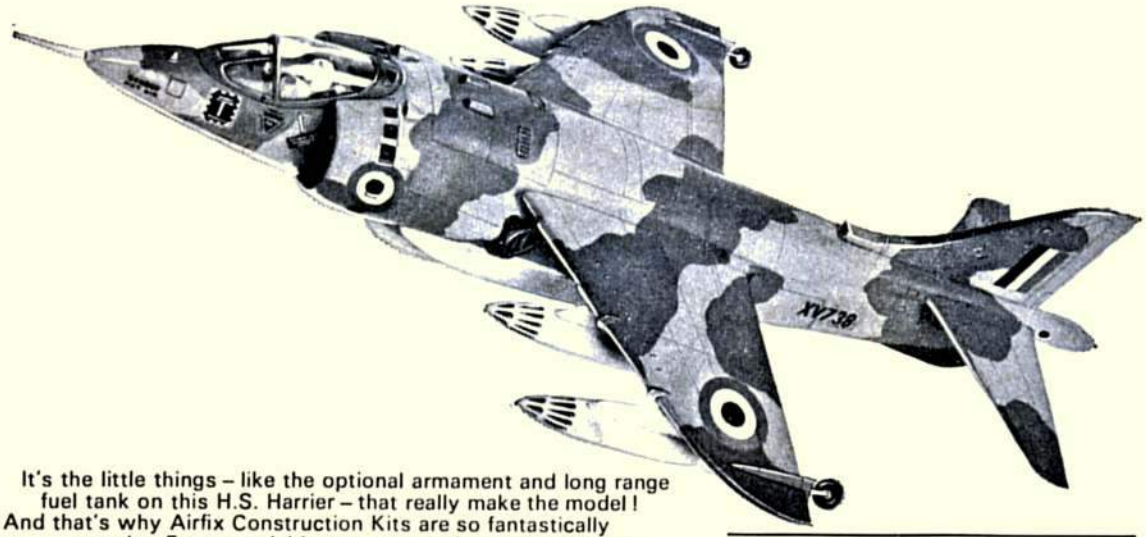

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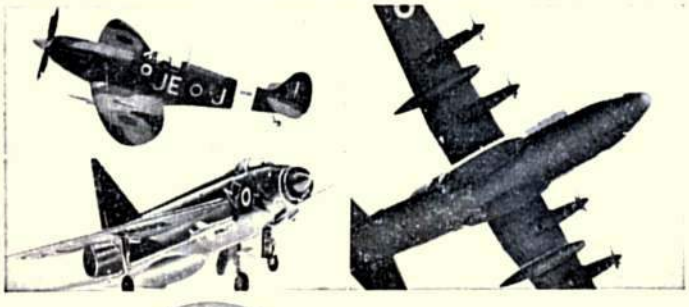
Top left: Spitfire. Left: E. E. Lightning. Right: Hercules



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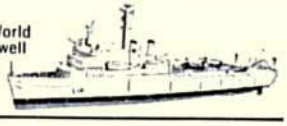

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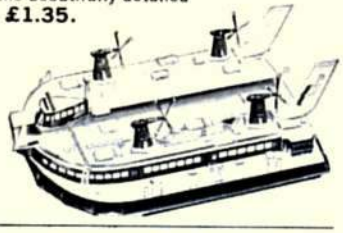

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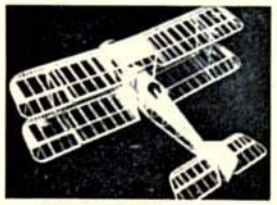

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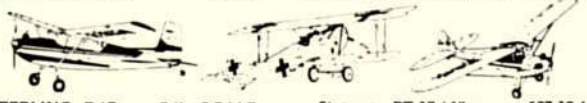

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PROPS FOR POWER PLUS!

TYPE A 2-bl tractor
TYPE B 2-bl pusher
TYPE C 3-bl tractor
TYPE D 3-bl pusher
TYPE E 6 x 3 5/11

TYPE B		TYPE C		TOPFLITE NYLON	
5½ x 3	2/9	5 x 3	5/3		
5½ x 4	2/9	5 x 4	5/3	5¼ x 3	3/-
6 x 3	3/6	6 x 3	5/11	5¼ x 4	3/-
6 x 4	3/6	6 x 4	5/11	5½ x 3	3/6
8 x 6	9/6			5½ x 4	3/6
9 x 6	10/6	TYPE D		7 x 4	4/11
10 x 6	12/-	7 x 8	8/11	7 x 6	4/11
Types A, B, C and E yellow nylon. Type D, aluminised nylon.		8 x 6	13/3	8 x 4	7/3
		8 x 8	13/3	8 x 6	7/3
		9 x 6	15/6	9 x 4	9/11
		10 x 4	15/6	9 x 6	9/11
		10 x 6	15/6	9 x 7	9/11

TYPE A			
5 x 3	2/3	8 x 8	6/11
5 x 4	2/3	9 x 4	8/6
5½ x 3	2/9	9 x 6	8/6
5½ x 4	2/9	9 x 7	8/6
6 x 3	3/6	9 x 8	8/6
6 x 4	3/6	10 x 4	9/6
7 x 4	4/6	10 x 6	9/6
7 x 6	4/6	11 x 4	10/6
7 x 8	4/6	11 x 6	10/6
8 x 4	6/11	11 x 8	10/6
8 x 6	6/11	12 x 4	15/6
		12 x 5	15/6
		12 x 6	15/6

10 x 3½	11/-		
10 x 6	11/-		
11 x 4	12/6		
11 x 6	12/6		
11 x 7	12/6		
11 x 8	12/6		
12 x6	12/6		
GRAUPNER 2-blade			
10 x 4	7/6	8 x 8	3/9
10 x 6	7/11	9 x 4	3/11
11 x 4	9/11	9 x 6	4/3
12 x 6	11/6	all 2-blade	

RMA/SEMO NYLON

7 x 4	2/6
7 x 8	2/11
8 x 4	3/3
8 x 6	3/6
8 x 8	3/9
9 x 4	3/11
9 x 6	4/3
all 2-blade	

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10 x 7	5/8	13 x 4	7/2
10 x 8	5/8	13 x 5	7/2
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11 x 6½	6/-	15 x 4	8/9
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049-09 single-channel R/C. De Luxe Kit, Finished wings **108/-** Wings only **39/-**

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2" (50mm)	8/11	3½"(90mm)	26/6

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2½" ... pr.	19/6	3½" ... pr.	30/-
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1" ... pr.	4/6	1¾" ... pr.	8/9
1⅛" ... pr.	5/6	2" ... pr.	9/11
1⅜" ... pr.	6/6		

Nylon Hub Tru-Spin Airwheels			
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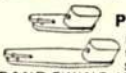

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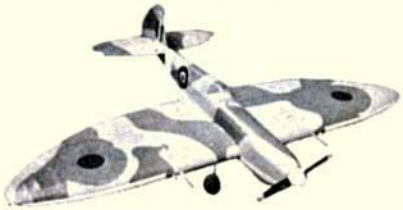

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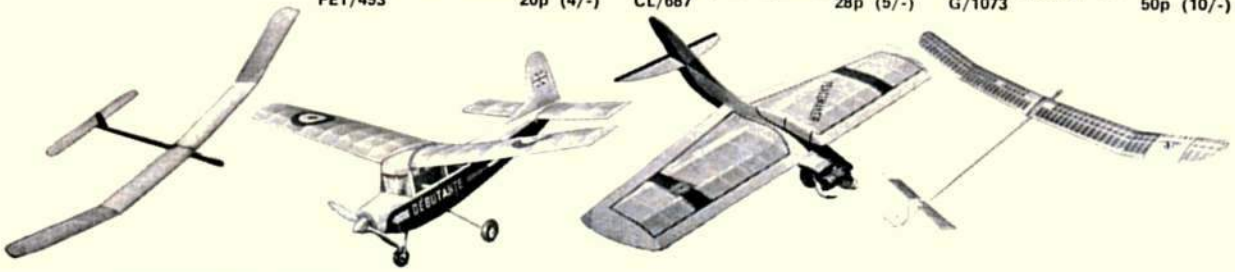

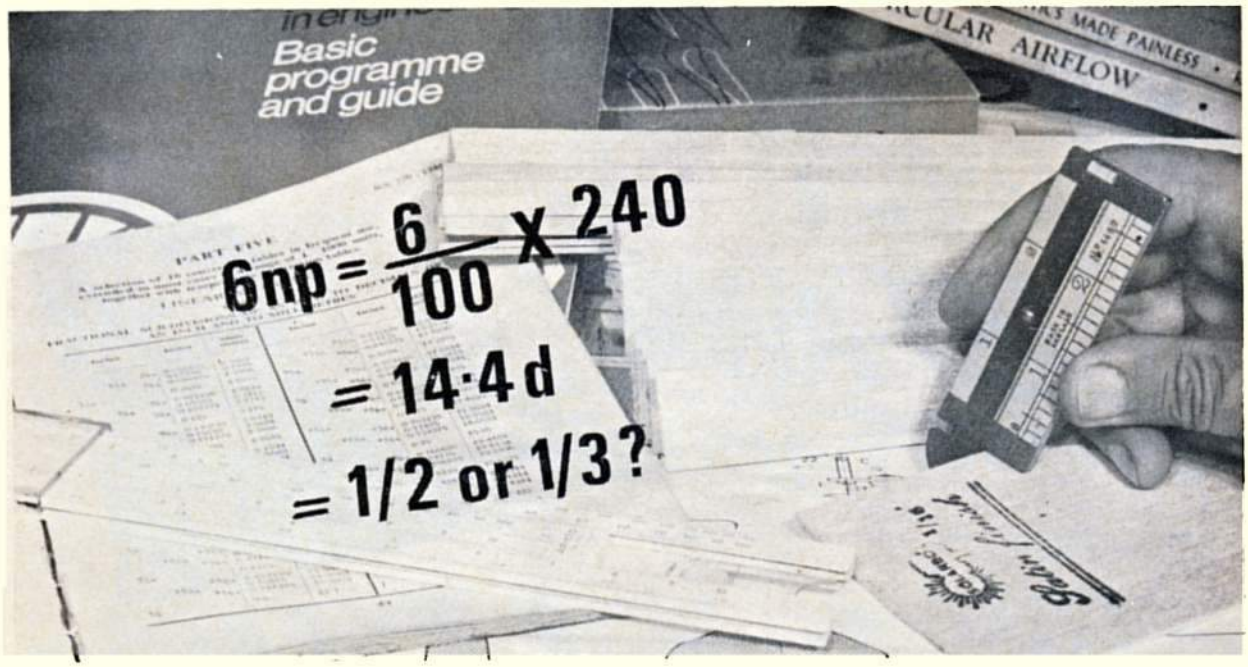

DOUBLE IT AND ADD A STROKE (/)!

Perhaps that piece of Balsa now costs you 6p. Now what was that in 'old English?' Six new pence is 6 hundredths of a pound – 6 hundredths of 240 (old) pence. A bit of paper and pencil work and we make that 14.4 (old) pence. Now what is that – 1/2 or 1/3? Even our faithful slide rule gives up here. Let's try to find a simpler method of conversion. Double the new pence and put a stroke between the figures. Double 6 is 12. Add the stroke – 1/2. Heaven knows why it works, but it does (most of the time). But don't ask for a simple conversion the other way round. We haven't found one.

Like everyone else, we shall have to 'join them', not fight the system. After all, it's only money. When it comes to aeromodelling, Balsa is more important. It is the least expensive part of a complete power model – and the most important. Everything depends on the Balsa airframe doing its job. And Balsa is one of the few commodities where prices have not skyrocketed over the years. Of course, Balsa does cost more than it did ten years ago or more, but not all that much. In present day terms it is even better value for money than before – compare the rise in price of other aeromodelling items.

But let's be realistic about it. Balsa can vary a lot in quality. To be sure of the best possible value for money (new or old pence) always insist on Solarbo Balsa – specially selected and graded and cut *for* aeromodelling use. We may not be so hot on decimal conversion, but we *do* know our Balsa!

Solarbo BALSA

ALWAYS ASK FOR IT BY NAME

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Line-up of La-5FN fighters from the Czech Mixed Air Division, note the shaft projection dogs for engaging a Hucks starter, a feature maintained for a long time on Soviet aircraft.

Heard at the HANGAR DOORS

HANGAR FLYING is by no means new: but recent developments at Spitalgate and Brize Norton give great encouragement. Electric RTP at the former, and indoor scale plus duration at the latter makes a welcome new trend. **ORGANISATION** at this year's 'NATS', now sited at Hullavington will not be to the extensive standards of recent years – unless more volunteers come forward to assist. Pathetically low response to the annual end of year request for nominees to serve on the S.M.A.E. sub-committees has resulted in a much under-staffed administration. Sole exception is Free Flight, where more than enough names came forward to the committee and a grateful Council adopted all of them *en bloc* to the strongest group within the S.M.A.E. For two of the other committees it could appear that only one nominating club showed enough interest to submit names! If everyone really wants to play Indians without any Chiefs that's fair enough – but don't expect anything more than an economy Nats this year!

INSURANCE company failures, particularly in motor vehicle business, have been hitting the headlines. So too have model flying accidents. One recent case involved severe injury for a modeller who went to hospital with broken ribs and extensive bruising. He was engrossed in his own model when another R/C model hit him in the back while being landed. This is so typical. It is the fourth nationally publicised model accident of its type. The landing pattern is the most critical phase of all R/C activity, and also the most damaging in terms of insurance experience. Increasing premiums are inescapable if the risk potential is not removed.

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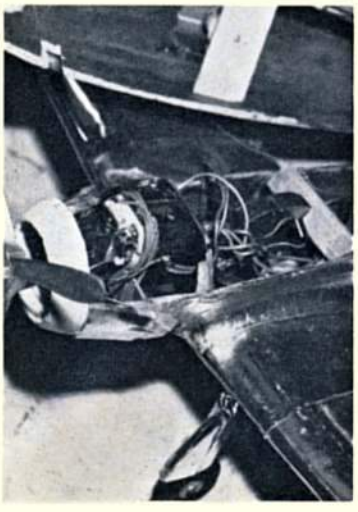
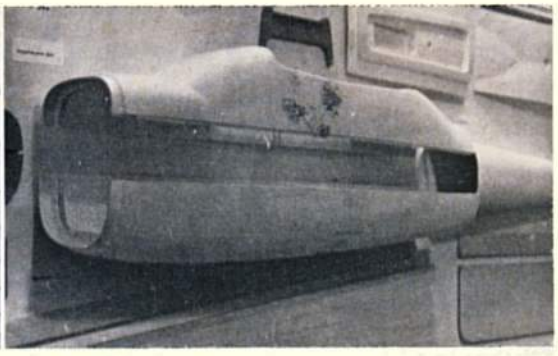
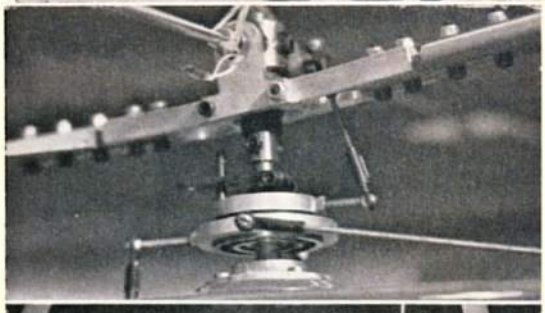
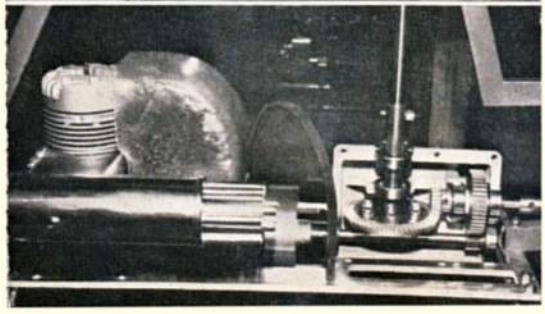
The Seversky Lancer sent from the U.S.A. by Pat March (co-author of the Electric Round the Pole feature in the Aeromodeller Annual) for demo at the Model Engineer Exhibition. Retract gear demands a complex circuit, now on test with Grantham M.A.C.





The new HP61 variants with bolt on rear covers and exhaust extensions incorporating angle to deflect exhaust from fuselage or allow for side thrust. Below are the two new HP40's. Note new silencer.





Nürnberg News

The International Toy and Hobby Fair at Nürnberg can be a most humbling experience. The British aeromodelling representative is apt to feel like a timid intruder among a swarm of busy hornets embroiled in tough competition for the big European market. In our field, **Mainstream** and **Humbrol** uphold the flag, with plastics companies naturally established in their permanent show stands. All else on the hobby floor is German, Belgian, Austrian, Japanese or U.S. by adoption. It is a simple fact that each Fair sees more new kits, accessories and innovations from West German sources in a year than we have the opportunity to announce from British manufacturers over a decade. One answer to this is that apart from model engines, the European market is self supporting. Even this situation is to change with Veco engines made in Germany under licence. Thus a competitive atmosphere exists to the extent that manufacturers often release some subjects (4 Nimbus, 2 Piper Cubs) simultaneously. The atmosphere was that of affluence in spite of the fact that some of the hitherto well established names in the German trade have fallen. Moreover, the local retail prices, devoid as they are from Purchase Tax or Import Duty, are at a comparatively low level.

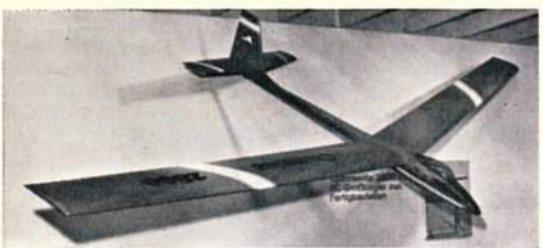
Gliders always predominate. **Graupner** has followed up the so successful *Cirrus* with the *Cumulus 2800* which is an almost ready to fly nine-footer that arrives with completely moulded fuselage in Polyamid (Nylon), foam wings sheathed in balsa and similar tail assembly ready to fit. It looks right, and from the Graupner publicity film is seen to fly right (from a castle turret atop a mountain!) It is partnered by the *Cardinal* no less an impressive piece of model engineering with a 3 part injection moulded fuselage

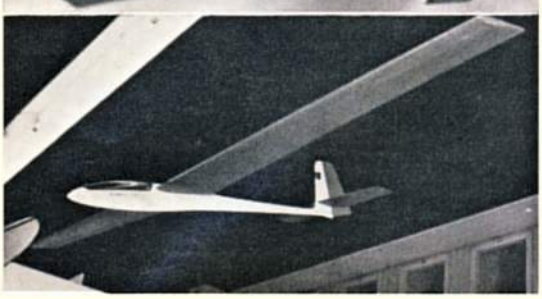
Top left, Graupner's Cessna 177 Cardinal for 30/40 engines is a super sophisticated pre-fab kit with injection moulded fuselage parts (at right), cowl, spats, prepared foam wing, etc. Below is the Dutch Helicopter by A. van der Velden of Rotterdam, a remarkable scale subject by any standards and at left, two views of the famous Schlueter Bell Huey 'copter, drive and rotor control system available in kit form.

and again those balsa sheathed surfaces. For the youngster, there's the *Bo 209 Monsun* quickie 22 in. rubber scale kit in pre cut printed balsa and for the radio fliers, a real breakthrough in the new mini-superhet which compacts four amplifying functions in one module at considerable weight saving. The **Schuco** glider of the year is a beautiful *ASW 15* to 1/5th scale with ready made glass fibre fuselage and their power kit is for the *Burda-Piper*, a Super-Cub under another name to reproduce any of the three machines used by a German publicity team. This six-foot scale model should have a fine reception, having such extras as flaps, glider towing, smoke bomb release or parachute dropping. Another *Piper Cub* is on the way from **Wik** Kits, this one being slightly smaller and the standard version.

KDH have many new accessories, mainly for R/C and including a new plastic for covering foam wings known as *Witalan* polyester sheet. **Krick's** success with the kit for the veteran *Klemm L 25d* has led to the *Grunau Baby* which catches the eye in direct contrast to all the plastic latter day beauties with its tissue covered scale framework. Obviously aimed at the Sunday flier, all of the new kits represent a change of trend. Gone is the R/C aerobatic contest kit. Yet more prefabrication is appearing in the 'kits', and for sheer sophistication (at a price) the amazing Helicopter by Dr. Schlueter seen at **Simprop** and A. van der Velden on the **Micro Prop** stand set a standard that has one wondering what the next 'impossible' target is for the virile German model trade.

Robbe's Nimbus, one of four kits for the same sailplane contrasts with Krick's Grunau Baby both in structure and concept. Below is the Graupner Cumulus, an almost ready to fly kit with Rowan's Nimbus at bottom. Below left a pair of Schuco Piper Cubs in Burda magazine blue/white colours.

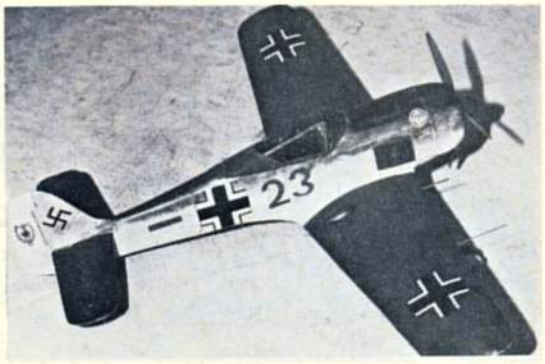




Model on the cover – Dave Wyatt describes his conversion of the 25¾" span Guillow

FOCKE-WULF 190

for electric round-the-pole flying

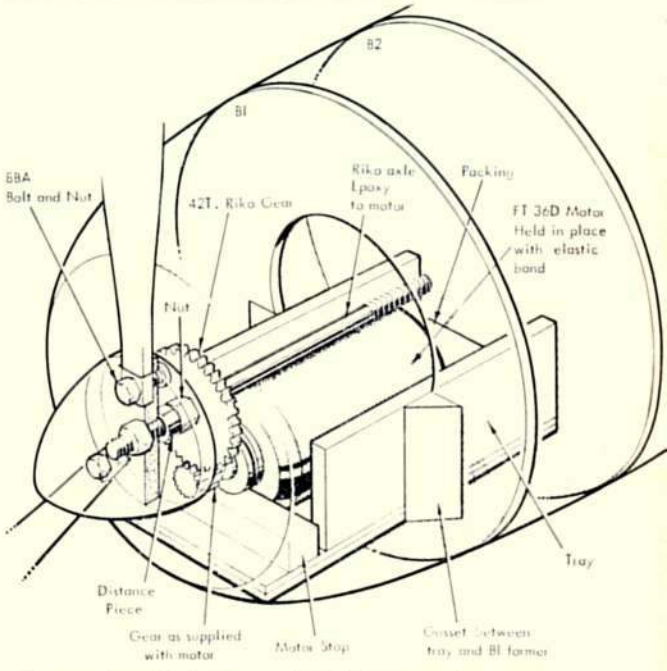


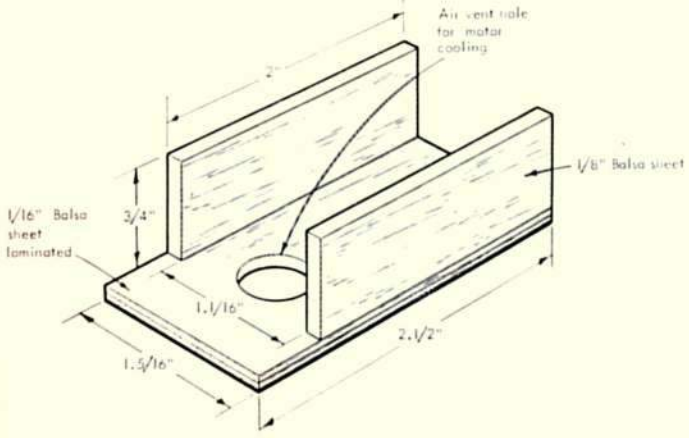
BUILDING the **Guillow** *F.W.190* for electric flying did not diverge very much from the basic construction. The wings, fuselage and tail unit were made exactly as planned.

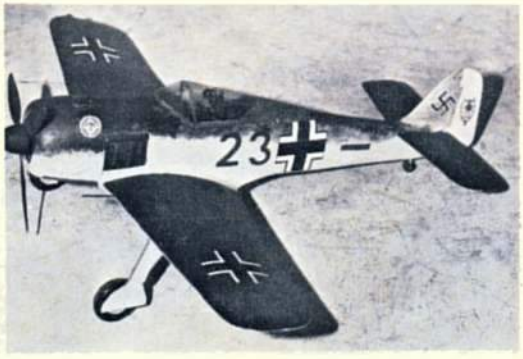
I decided to cover the whole plane in 1/32 in. sheet balsa and finish off with lightweight tissue to give added strength. I also added symmetrical strips to the tailplane, fin and rudder to give a better shape. The tailwheel that was shown on the plan was discarded and a rubber wheel fitted. Wire supplied in the kit for the undercarriage was too light, being only 3/64 in. and I replaced this with 14 s.w.g. wire. I would also advise that the plastic wheels supplied be replaced with rubber wheels, for two reasons. They take some of the shock when landing, which can be a bit vicious on electric flying, and they don't wear the centres and split.

When fitting the undercarriage to the wings, strengthen all round the joint with some ¼ in. sheet scrap balsa. I fitted this model with an FT 36D because of its better torque. The same 10-tooth pinion which is supplied with this motor was retained and a 42-tooth wheel was fitted to mesh with it by using a Riko slot car axle, epoxy glued to the motor.

Mounting the motor in the model creates little difficulty. Cut down the first former to take a balsa wood tray, made up of two laminations of 1/16 in. for the base, taking the ¼ in. sheet sides of the tray to just over half the depth of the motor when the motor is lying flat on the tray. Drill holes in the bottom of the tray to aid motor cooling. Make the tray long enough to fit just inside the cowling to the second former, B2, to which it is attached. A small piece of packing behind the motor will be necessary to bring the lay or prop shaft through the cowling. It was also necessary to have a small bush for the airscrew to clear the cowling. Being unable to purchase a three-bladed prop, I decided to make one to scale, cutting the blades from 1/16 in. Duralumin bolted and epoxied to a piece of three-ply cut to the same diameter as the spinner. Allow enough room in the centre to fit airscrew retaining nut.







topical twists

by 'Pylonius'

'Imaginative, but it doesn't look like a flying machine'.

Cartoon by M. E. REYNOLDS

Look Back in Anger

I SAW RECENTLY a few extracts taken from some old wartime *Aeromodellers*. These were very much the 'writing on the wall' type of thing; dire forebodings of such sinister things to come as radio controlled and wire operated models, not to mention the possible taming of the still friendly thermal with burning bits of fuse.

Generally, though, the tone of the mags of that day was remarkably peaceful considering that there was a war on. Not a wounded warrior or a crashed aircraft in sight, which, at a time when we were supposed to be at our bloodthirstiest, was very curious indeed. Even more curious by contrast is the gory nature of the model mag scene today, where on every second page you are threatened by an insect-like creation that could sizzle you up faster than a four-second power run, and if you have a taste for plastics you can re-fight almost every battle in history, from the siege of Rome to Custer's last stand. Altogether, the amount of carnage and destruction you can purchase for a few near plastic new pence is as staggering as the survivors on the retreat from Moscow, up to their ears in snow and musket balls and trampled on by the hooves of Boney's horse.

For those with an even more macabre taste for the gruesome, there is a medical reconstruction of von Richthofen's violent demise, fully illustrated with exploded views of his bullet exploded anatomy.

Excuse me while I dash off to the flying field with a white flag.

More Cover Needed

We usually associate inflation with things going up, but the recent increase in the Society's insurance cover is due to things coming down with a bang. What particularly riles me about this is the double triumph of the radio knockabout comedians, who have not only driven me off my local flying field but now have the gall to expect me to contribute more handsomely to the high insurance costs of their rampant style of flying.

What I feel is needed in radio flying is a way of scientifically reducing the critical danger period, which is roughly the time between the model being launched and the termination of the flight. Perhaps one answer is to put radio models on a par with power duration jobs by restricting them to a ten second motor run from a non-sprint starting line. This, I calculate, would give me a sporting chance of getting back across the flying field before the local 100 metres launching champion can get me diving for cover.

It's for Real

Multi radio modelling is not the grand ultimate that many people might think. There comes a time in the career of the really ambitious model builder when he gets tired of cricking his neck and looks for something to give his neck muscles some reverse work to do, and what better way than by gazing down from his own home-made cockpit.

Apparently, constructing a full size machine is much the same as building a model, except that the wife walks out on you much earlier, often just before she becomes a widow. Possibly, though, the building of a full size job is much easier. In fact, I am sure of it since I was inveigled into building a diminutive kit model for a small boy. What a joy it must be to get to grips with a large size in ribs after getting it in the neck for coating up the tweezers with cement.

Addicts Anonymous

The model plane's brighter-than-bright public image took on an apologetic shade of tarnish after that infamous report of our hobby craft being used for smuggling drugs and other merchandise into the country. Comfort, though, from the newspaper reports, for, whatever U.F.O. type of flying machine was involved, it was nothing like our homebred little efforts. For one thing it appeared to have variable geometry, as it reduced in span from 12 to 8 feet by the morning edition. It also could fly in the face of the Einstein theory of mass increasing with velocity, as the payload increased from 10 to 30 lbs. at the same time as the plane grew smaller.

What was not mentioned was that the model plane is the most anti-social drug of all; a few injections of cement and balsa and the victim is often hooked for life, much to the detriment of his functioning as a good, conforming citizen. The first outward sign of addiction is the dirty car syndrome, although the word writ large by finger on the side panel is not that of the model club. After that, he goes progressively downhill, but the fact that his house is the only unpainted one down the street makes it easier for his model flying pals to find. All things have their happier side.

However, the extreme point is not reached until he gives up watching television and moves either into a back room or a shed in the garden. There you will find him up to his ears in balsa shavings and surrounded by what looks like the proceeds of a four week dustman strike. Don't attempt to move him, advises the Doctor. It's as good as a padded cell.

Aircraft Described

No. 202

LAVOCHKIN LA-5FN & LA-7

described and drawn by G. R. DUVAL

IN 1938, the Soviet Government ordered an aircraft design competition for the express purpose of providing successors to Polikarpov's I-15 and I-16 fighters, emphasis being laid upon ease of production and the use of non-strategic materials. In this latter requirement, the Lavochkin bureau had a head start, for Semyon Lavochkin and his associates Gorbunov and Gudkov had been experimenting for some time with the bonding of laminated wood veneers by phenol-formaldehyde resin. The experiments had reached a high pitch of success by 1937, and a fighter aircraft was built for the competition, utilising the new material. This was the Lavochkin I-22, a low-wing monoplane powered by the 1,000 h.p. M-105 liquid-cooled in-line engine; the other contenders were Mikoyan's MiG-1, Yakovlev's Yak-1, and the I-28 designed by Yatsenko, which also featured chemically-bonded veneer in its construction. The I-28 was rejected, while the other three aircraft became prototypes for a whole range of second generation Soviet fighters.

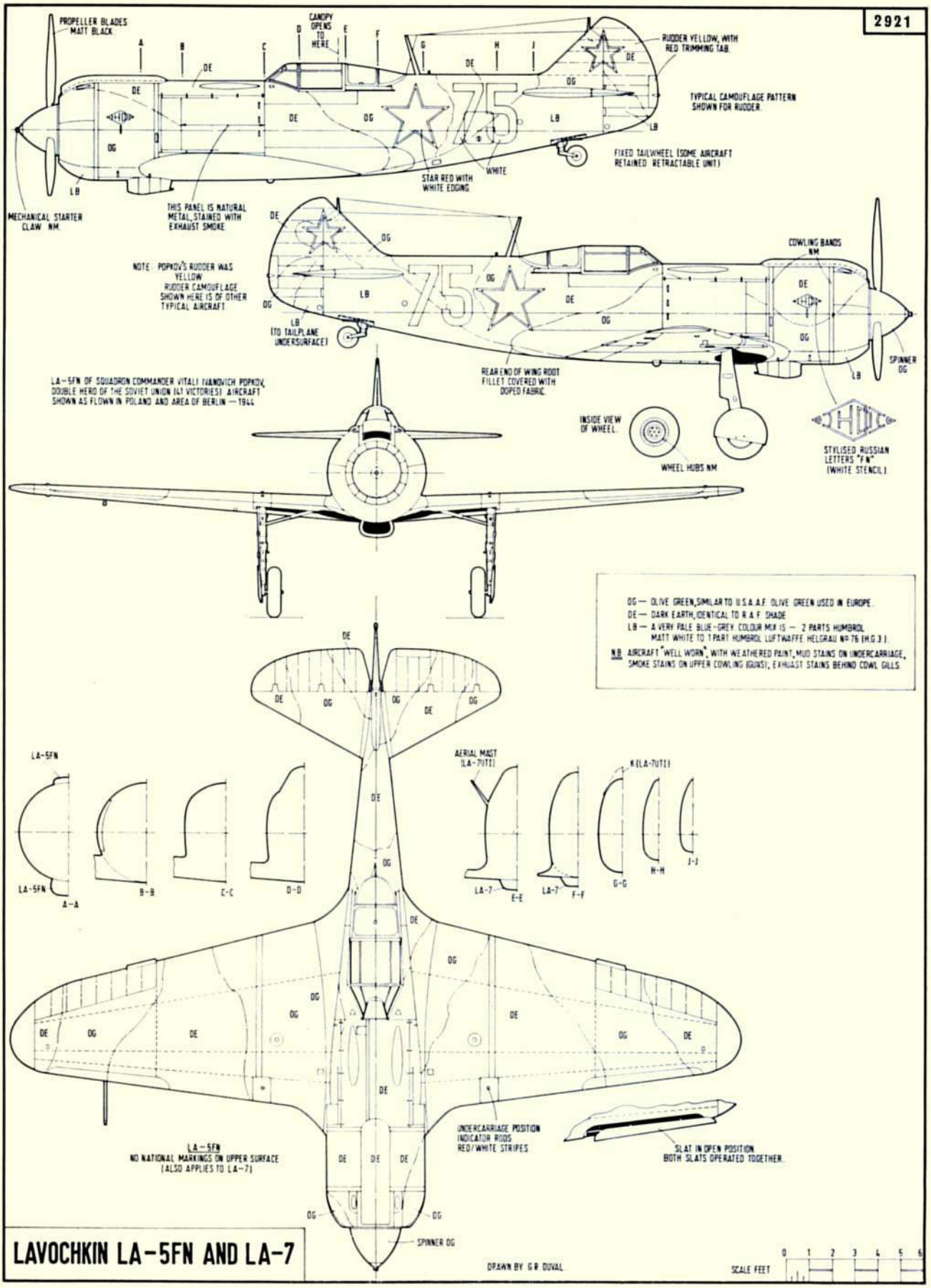
The I-22 entered limited production as the LaGG-1, being issued to the fighter regiments in 1940, and a modified version, the I-301/LaGG-3, powered by the M-105PF engine, followed in late 1940. Structurally, these aircraft were a great achievement, but operationally they were not, the pilots soon claiming that 'LaGG' stood for three Russian words meaning 'varnished guaranteed coffin'! This unhappy situation was only remedied in part by a series of modifications, and Lavochkin urgently sought some means of saving his fighters from relegation to the training units. There was no time for a complete redesign now, for on June 22nd, 1941, Germany invaded the Soviet Union, and in the first nine hours of battle some 1,200 Russian aircraft were destroyed. Acting on impulse, Lavochkin ordered an example of the new Shvetsov M-82 radial engine, developed from the Wright Cyclone, and offering 1,600 h.p. It arrived in October, 1941, and immediately the whole bureau commenced intensive design studies to ascertain if the LaGG-3 airframe would accept a radial engine. After many sleepless nights, success was achieved. The M-82 was close-cowled to reduce drag to a minimum, and further compensation came with the reduction in weight occasioned by removal of the M-105 cooling system, cowlings, engine bearers and oil system. Coincident with this work came the retirement of Gorbunov and Gudkov from the bureau; thus the official designation of the new aircraft was recorded as La-5. The La-5 replaced the LaGG-3 on the production lines during the summer of 1942, 1,129 aircraft being completed by the end of the year, and production La-5s reached the fighter regiments in the autumn, just in time for action at the Battle of Stalingrad. Here, they earned the title of 'Wooden Saver of Stalingrad', and a Stalin Prize for Lavochkin.

The main production of the La-5 took place at State Aircraft Factory No. 21, home of the Lavochkin bureau, and many improvement modifications were made in the factory. The standard armament

Exhibited in the Prague Museum is the reconstructed LA-7, shown above, possibly the finest example in preservation.

Full-size copies of the 1/24th scale original plus reprints of this 1/72nd scale feature are available price 45p, as Plan Pack JH 2921 from Aeromodeller Plans Service, 13/35 Bridge Street, Hemel Hempstead, Herts.

Distinction of the LA-7 in its centre section profile is clear in this view of the aircraft restored by the Czechs.



LAVOCHKIN LA-5FN AND LA-7

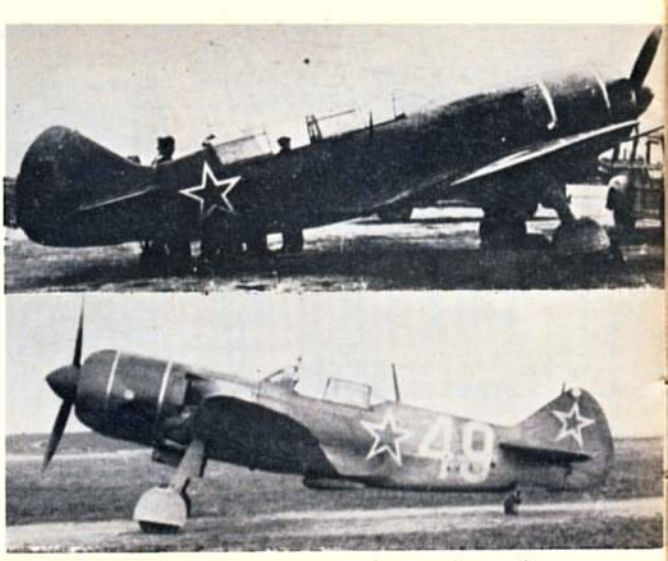
DRAWN BY G.R. DUVAL

SCALE FEET 0 1 2 3 4 5 6

was two 20 mm ShVAK cannon, mounted in the upper cowling and synchronised to fire through the propeller arc; these guns were belt-fed, delivering 950 rounds per minute each. A few pre-production aircraft were designated LaG-5, retaining the unchanged rear fuselage of the LaGG-3, with its canopy faired into the fuselage decking, but all the La-5s had cut-down rear fuselages and framed bubble-type canopies for 360-degree pilot vision.

In March, 1943, a new sub-type was introduced as the La-5FN, powered by the 1,650 h.p. M-82FN engine; 'FN' being the initial letters of two Russian words meaning 'directly boosted' – i.e. direct fuel injection. This model featured a large intake scoop above the engine cowling, a slightly increased wingspan and reduced chord, automatic leading-edge slats, and underwing mountings stressed to accept rocket rails for four RS-82 (82 mm) missiles or racks for two PTAB hollow-charge anti-tank bombs. A modification made universally to most aircraft, La-5s, La-5FNs, and the later La-7, was the locking down of the retractable tail wheels, the mechanism of which did not take kindly to the ingress of mud. Less obvious modifications were the replacement of some wooden airframe structure with metal, and the fitting of lower capacity fuel tanks. A further reduction in weight was made by lighter structure undercarriage components. The result of all this work had its effect in making the La-5FN 350 lb. lighter than the La-5, with consequent improvement in performance. Most Russian fighters were designed for operation at altitudes below 18,000 ft., for, unlike the air strategy employed in Western Europe and elsewhere, the Russian use of air power was almost entirely in support of the Red Army. A good example of this may be found in the gigantic tank battles around Kursk in July, 1943, where La-5FNs joined the IL-2m3 'Shturmoviks' in a violent attack against German armoured columns, then climbed a few thousand feet to act as top cover. The Luftwaffe Bf 109s and FW 190s were, therefore, compelled to fight at low level, far below their best operational height, finding

Top: an LA-5 FN in perfect side profile, and at bottom, another version of the same machine, curvature at the tip of the rudder appears to differ considerably and in some cases is completely smoothed into a radius.



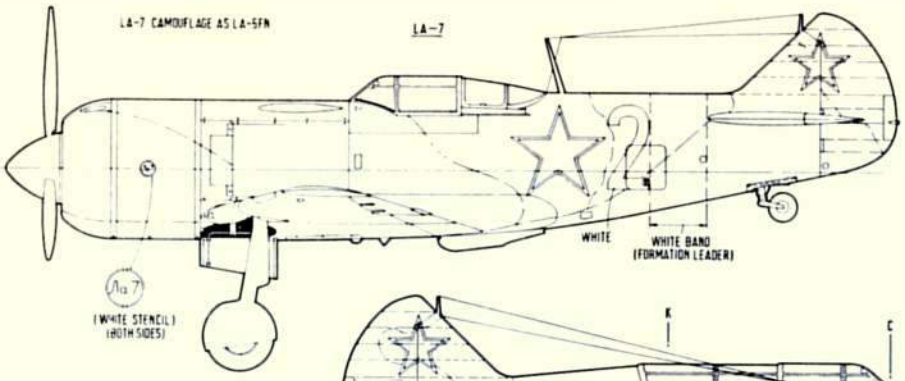
Top: the comparatively rare two-seat trainer version of the LA-7 UTI and immediately above, a side profile of the LA-7 as used by the Second Fighter Regiment of the Czech Mixed Air Division in Russia.

themselves completely out-manoeuvred and outfought by the nimble Lavochkins. Additionally, the La-5 was capable of absorbing severe battle damage, and very few went down in flames owing to the fact that their fuel tanks were armoured, self-sealing, and 'topped-up' with inert gases from the exhaust system.

In 1944, an improved version of the La-5FN joined its predecessor on the production lines, and later in the fighter regiments. This was the La-7, powered by the M-82FNV engine and slightly altered in appearance by repositioning of the air intakes, simplification of the centre section leading edge, and the introduction of 'D' doors to completely cover the retracted undercarriage. The leading Russian fighter ace, Ivan Kojedub, scored his last 17 victories while flying an La-7, and this aircraft is now preserved in Moscow. In common with a few top aces, Kojedub was permitted to have his aircraft somewhat more colourfully decorated than the usual camouflage scheme and white numerals, but there is some doubt that the present colouring represents the original. There is also some doubt concerning the armament of the La-7; various sources quote three 20 mm or 23 mm cannon, with the third gun mounted on the port side. Extensive research has failed to find any supporting evidence for this installation, although it is probable that an La-7 was used for armament tests concerning a later development, the La-9, which did have such armament, and saw service in the Korean War.

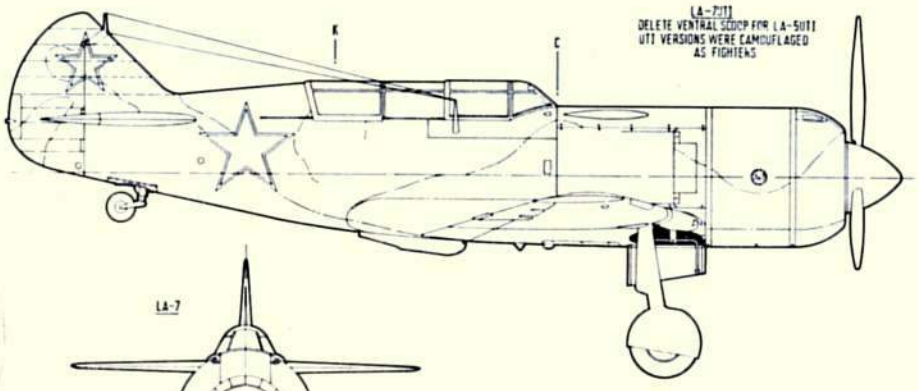
Both La-5FNs and La-7s formed the equipment of the Czech Mixed Air Division, formed in the Soviet Union in June, 1944, and in September this unit flew from airfields behind the German lines, in support of the Slovak Uprising. After the war, the Division became the nucleus of the new Czech Air Force. One La-7 is preserved at the new Prague Air Force Museum, following complete refurbishing by a group of enthusiasts and original display in the Prague Technical Museum.

Both the La-7 and the La-5FN were modified for use as fighter trainers, with the usual designation of UTI, by the addition of a second cockpit, repositioning of the aerial mast, and removal of one of the two guns. Every fighter regiment had at least one UTI aircraft, and at times of intensive action these machines were used for operational flying.

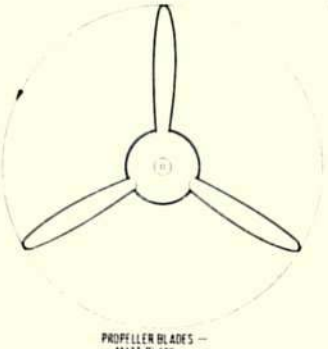


CONSTRUCTION DATA

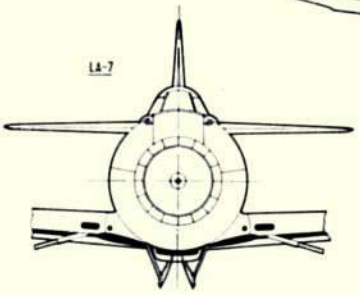
WINGS, TAILPLANE, AND FUSELAGE AFT OF SECTION 'C' – COVERED WITH BONDED PLYWOOD
CONTROL SURFACES: FABRIC-COVERED METAL
FLAPS: METAL
FUSELAGE FORWARD OF SECTION 'C', WING-ROOT FAIRINGS, INSPECTION PANELS, UNDERCARRIAGE FAIRINGS – METAL

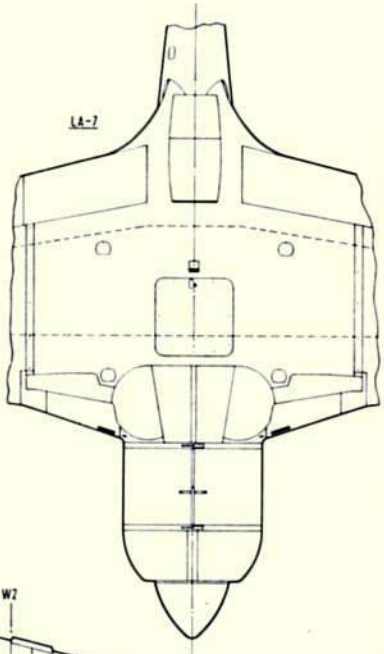


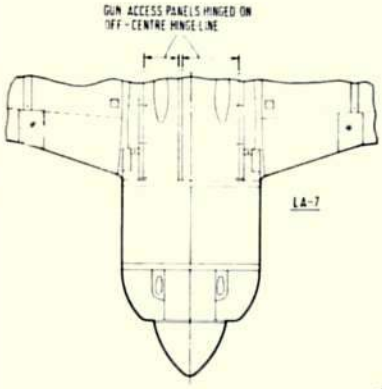
LA-7(?)
DELETE VENTRAL SCOOP FOR LA-5UTI
UTI VERSIONS WERE CAMOUFLAGED AS FIGHTERS

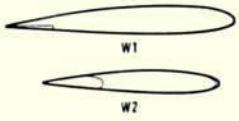


PROPELLER BLADES – MATT BLACK









LAVOCHKIN LA-5FN AND LA-7

DRAWN BY G R DUVAL

SCALE FEET 0 1 2 3 4 5 6

FLYING SCALE MODELS

by Eric Coates

Part II: Selection of Prototype

TWENTY YEARS ago the literature available on aeroplanes was only a minute fraction of that available today. The data available to the aeromodeller, from which to choose a suitable prototype for a flying scale model, usually consisted of 1/72nd scale drawings of dubious accuracy and what photographs one could lay one's hands on. Information on 1914-18 types was particularly scanty. The museums and collections were not anything like as extensive in their stocks of aeroplanes either, so it was difficult or impossible to view and photograph for oneself a chosen subject. Today, the situation is vastly different. Apart from the multitude of excellent reference books on aeroplanes, containing many superb photographs and coloured plates, the number of aeroplanes on general view to the public in this country is considerable – the best places to view aeroplanes being the Imperial War Museum, the Science Museum in London, the Shuttleworth Collection at Old Warden near Biggleswade and the Naval Air Museum at Yeovilton. When the R.A.F. Museum opens at Hendon shortly, the greatest array of all will be on public view. In addition, many vintage machines are in private ownership, or in the custody of the various aircraft manufacturers. Usually, such machines can be viewed and photographed by special permission of the owner who is usually only too pleased to co-operate. Extra data, particularly on markings and sub types, can be obtained through perusal of the records of the Imperial War Museum Photographic Library. I have found the personnel there particularly helpful when I was researching data for my BE.12b (illustrated last month) a little known defence fighter derivative of the BE.2c. Unfortunately the library may only be viewed, by appointment, on Tuesdays to Fridays, 10 a.m. to 5.00 p.m.

Heading picture shows the author's S.E.5a, built in 1968. A low thrust line such as this aircraft possesses requires some downthrust to bring the thrust line above the C.G. Below, another of Eric's models is the Miles Hawk of just 22 in. span, weight was only 6 oz., despite being all sheet-covered.

The standard of scale contests, particularly in R/C, has now risen so high that it is imperative that a comprehensive set of photographs and dimensions of the scale subject is obtained to produce an accurate reproduction. These can only be obtained by visiting the original or diligent research amongst the archives. For the average aeromodeller, however, a good G.A. drawing and two or three photographs or a 'Profile' should suffice. A word of warning though, do not take the printed colours to be 'gospel', they are artist interpretations of what he thinks the colours were on the original and sometimes considerable licence is taken and even then, the printing process alters tones.

With regard to the general arrangement drawing, again beware of some of the originals provided by co-operative P.R.O.s of the aircraft manufacturers. These again are very often far from accurate. Aeroplanes were not built from such drawings, they were very often drawn by the most junior of draughtsmen for illustration purposes. Aircraft manufacturers usually have good quality photographs available, though, of their past products. Usually they are of prototypes and do not show service markings, however. The best source of suitable G.A. drawings is (naturally!) the *Aeromodeller*. These are very accurate and available in several scales; usually 1/72 in. and 1/48 in. A full list of drawings available may be obtained from A.P.S. on receipt of an S.A.E.

Having covered the sources from which information is available let us now consider the choosing of a suitable aeroplane to model. There is an old aeromodelling saying that even a brick will fly, if you trim it properly! Whilst I won't altogether agree with the statement in its literal sense, there is a considerable amount of truth in it. Virtually all model aeroplanes can be made to fly free flight for a while, but for regular operation a degree of inherent stability is desirable if the model is to fly in anything but a flat calm and land in one piece. As a rider to the 'brick' saying it should be added that a light brick is a darn sight easier to trim than a heavy one! To enlarge – although weight has no relation to stability it has a direct relationship on the flying speed. Inevitably during the early trimming stages the model is almost bound to strike the ground at some pretty awkward angles and the slower it does the striking the better. It is very easy when making scale models to get wound up in the weight/strength vicious circle. One needs a certain amount of strength in the structure to withstand the impact, therefore, one makes the model stronger and heavier, so it hits the ground even harder and requires more strength and

Terry Manley's Hannover CL 111a flew well, despite small tailplane area, although very careful trimming was necessary to avoid causing a stall.

so on. It is very difficult to know when to stop. We shall deal with this problem in greater detail in the chapters on structures.

To return to the stability problem, I do not propose to go into the theory of stability in great detail. Many articles have been written on the subject over the years in this publication, and any volume on basic aerodynamics will explain all that is required for those interested. However, I think it advantageous that we look at the types of stability we are interested in and point out the desirable attributes in an aeroplane to ensure it possesses sufficient inherent stability to keep itself out of trouble.

(a) **Lateral Stability:**

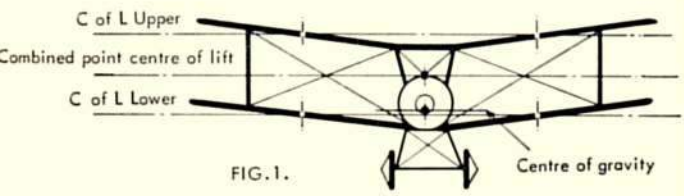
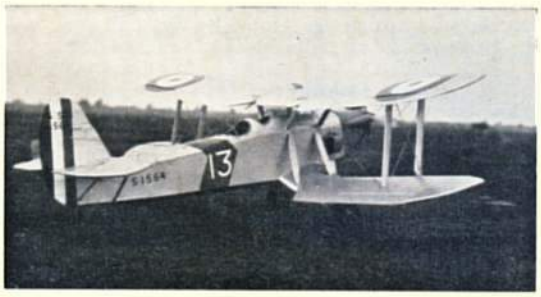


FIG. 1.

Lateral stability is the stability of the aircraft in the rolling plane; i.e. with the aircraft trying to turn about a line through the fuselage. Both static and aerodynamic forces act upon the aeroplane and affect its inherent lateral stability. The mass of the aircraft can be said to act at its centre of gravity and the summation of all the lift forces act at the centre of lift. For an aeroplane to be laterally stable it is essential that the C.L. is above the C.G. The higher the C.L. above the C.G. the more stable will be the aircraft. It can therefore automatically be seen that the parasol machine, i.e. an aeroplane with one high-set wing, such as a Fokker DVIII or a Westland Widgeon, has a very stable layout. Biplanes are generally very good also, particularly if the upper wing is set high. Other factors too, influence the stability of biplanes. Only if both wings are identical in area and work at the same angle of incidence can the C.L. be said to act midway between the planes. If, as very often is the case, the upper wing is of larger area than the bottom, or is working at a greater angle of incidence, then the C.L. will be raised. Similarly the amount of dihedral present will lift the C.L. The worst case for lateral stability is the low wing model and it is for this reason that they are the least popular of all free flight models. However, it is possible to make a low-wing stable. The use of a heavy



undercarriage and concentration of the weight in the bottom of the fuselage, coupled with a fair degree of dihedral can usually get the C.L. above the C.G., but not very far unless an exaggerated amount of dihedral is used, which completely ruins the scale appearance. Low wingers then are generally on the margin of stability and can be expected to have to take a fair amount of punishment. For this reason they should be built light and strong. This invariably means small also, to stand the punishment it is sure to get. The Miles Hawk illustrated was just 22 in. span, all sheet covered and weighed only 6 oz. Powered by an E.D. .46 c.c. diesel it flew well on power but fell out of the sky when the engine cut. Knock-off wings and the light weight, however, prevented damage.

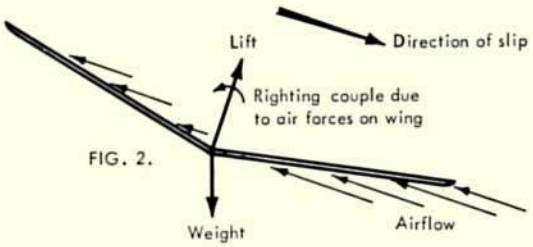


FIG. 2.

Dihedral has another effect on the stability of an aeroplane apart from raising the centre of lift.

When a gust upsets the attitude of the model, as shown in Fig. 2, the weight of the machine will cause it to sideslip, the airflow strikes the undersurface of the lowest wing and the upper surfaces of the highest wing causing a righting couple, to bring the aircraft back to an even keel. The greater the dihedral angle the greater will be the projected area in the slip flow and, therefore, the greater the righting couple.

Sweepback, which also affects directional stability, has an effect on lateral stability also. This is rather difficult to explain but the combination of normal chordwise flow over the wing with the slip flow combines to give a stabilising moment similar to that shown in Fig. 2. The effect is not as marked as with dihedral though. I have found that 3 deg. of sweepback gives approximately the same stability effect as 1 deg. of dihedral. When considerable sweepback is present, as in the Jüngmann illustrated last month (11 deg.), then a very stable set-up is assured.

The large fin on the author's Blackburn Ripon illustrates his point concerning this necessity with long-nosed aircraft.

(b) **Longitudinal Stability**

Longitudinal stability is the stability of an aeroplane in the pitching plane, i.e. with the aircraft trying to turn about a line through the centre of gravity, parallel to the wings. Oscillatory motion about this axis is what is generally called stalling. Reference to Fig. 3 will show the four major forces acting about this line when the aircraft is in level flight. First we have the weight W acting directly through the centre of gravity and therefore having no movement.

Second, we have drag D, acting through the centre of drag, a distance 'd' from the C.G. If the centre of drag is above the C.G. as in Fig. 3, the drag will produce a nose-up pitching couple. If the centre of drag is below the C.G. then the drag will produce a nose-down pitching couple. Generally, high wing machines and biplanes have their C. of D. above the C.G. and low wing machines vice-versa.

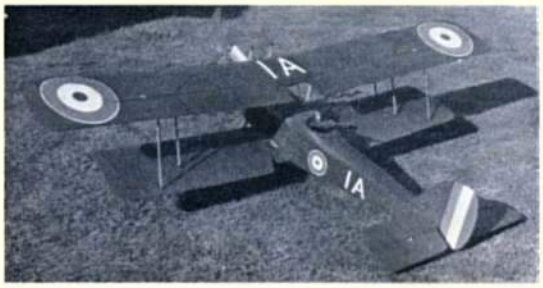
The third force to consider is the lift L, acting through the centre of lift, a distance 'l' from the C.G. If the C.L. is aft of the C.G. then the lift will produce a nose-down pitching couple i.e. If the C.L. is forward of the C.G. then a nose-up pitching couple will result. The set-up as shown in Fig. 3 is a stable one because drag and lift tend to cancel each other out. When one trims for glide by ballasting, either forward or aft, one alters the C.G. in relation to the C.L. and C. of D., so that at the natural gliding speed, i.e. when W $\simeq$ L, the forces are in equilibrium.

The fourth force, thrust 'T', of course, is only present when the engine is running. The thrust line should pass very close to the C.G.; preferably just above it. Again in the trimming process adjustment to the thrustline, i.e. downthrust or upthrust, may be necessary to maintain our equilibrium of forces when the engine is running. Almost certainly when under power and flying faster than when gliding, the balance of the L and D couples will not be maintained and, therefore, the thrust couple T will have to provide a compensation to maintain equilibrium.

It can easily be seen that aeroplanes with low thrust lines like the D.H.4 or the SE5a will require a certain amount of downthrust to bring the thrust line above the C.G. With an aeroplane like the B.A.C. Drone it is impossible to bring the thrust line near the C.G. and, therefore, only very low-powered motors can be used in such a position if an unstable pitch-down attitude is to be avoided.

To return to Fig. 3 and our balance of force couples about the C.G. Everything would be fine as long as the aircraft flew in perfectly smooth air in a straight line. As we all know, such conditions just do

The R.E.8 is a very stable aircraft due to the high CL, caused by having the top wing of greater area than the lower. This example was built by Terry Manley, and won the Super Scale trophy in 1969.



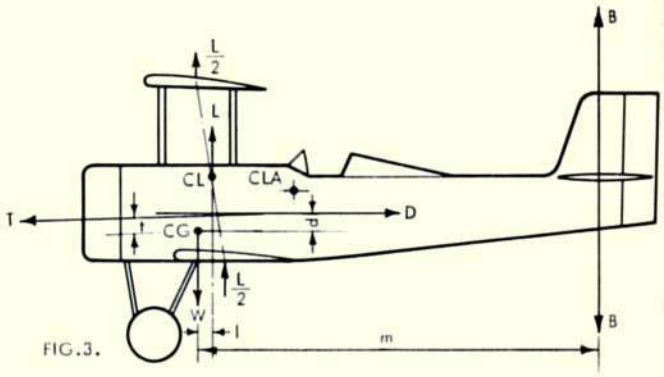


FIG.3.

not exist and, therefore, some means of stabilisation to keep the whole set-up in equilibrium when disturbing forces affect it, is necessary. This is provided by the tailplane. If the aircraft starts to pitch nose-down, air pressure on the top surface of the tailplane produces a force B, acting in a downward direction through the centre of pressure of the tailplane, a distance M from the C.G. Similarly, when the aircraft pitches nose-up, a similar couple Bm tries to bring the balance of force back into equilibrium. The degree of balancing force is, therefore, controlled by the area of the tailplane and the length of the tail momentum. Hence aeroplanes with large tailplanes and/or long tail moments are very stable longitudinally. Good examples being the Sopwith 1½ Strutter (large tailplane area), Avro 504 (long moment) both illustrated in last month's article and the B.E.2c (enormous tailplane and good moment). This does not mean to say that models with fairly short moments and small tailplanes cannot be made to fly satisfactorily; both my Leopard Moth, which had a tailplane area of only 8 per cent of the wing area and the Hannover were very good fliers, but required careful trimming to avert any stalling tendency.

Of course, one can always cheat and increase the area of the tailplane in relation to the wings – a practice very popular in the old rubber-powered days, but generally this is unnecessary except in extreme cases which are best avoided anyway. No serious scale modeller today should consider increasing the tail area as he would be severely penalised in a competition.

One final word on tailplanes. I have found the symmetrical section, as opposed to the lifting section (Clark Y thinned), to be superior in all ways for scale models. Not only is it usually the section used on the full-sized prototype, but its symmetrical damping effect is more suited to scale models. I always set the tailplane parallel to the fuselage datum and attach the elevators with stiff alloy hinges. Trimming adjustments then can be made by setting the elevators to the desired angle. We shall deal with the construction of tailplanes in a later article.

(c) **Directional Stability**

Generally, considerations of directional stability have little influence in the selection of a prototype. Most aeroplanes which are suitable in meeting the requirements of (a) and (b) will be directionally stable. Directional stability is the stability of an aircraft when turning about an axis vertically through the C.G., parallel to the fin. It is dependent on the position of the centre of lateral area (CLA). Referring to Fig. 3 it can be seen that the CLA, i.e. the

centre of the total projected side areas, is well aft of the centre of gravity. This is common with most fairly short-nosed biplanes and a desirable feature. The 'weathercock' stability keeps the aircraft in a straight path, damping down any violent tendencies to turn. When the nose is longer, as in later inline-engined aeroplanes, then a larger fin is desirable to keep the CLA aft.

The effect of the Gyrocouple and Torque

Two further forces act on a propeller-driven aeroplane when under power. These are the gyrocouple and torque. The latter is generally fairly well understood and feared, the former, which on a F/F scale model is far more important, less so. When viewed from the front, virtually all model aircraft engines rotate in an anti-clockwise direction, as do virtually all rubber model propellers. There is no reason for this, as far as I can see, it is just convention, apart from the fact it is probably easier for a right-handed individual to flick in an anti-clockwise direction. Anyway, the couple caused by the propeller rotating, has to be reacted. In a power model this couple, known as torque, is transmitted via the crankcase to the bearers and if unresisted would result in the fuselage rotating in a clockwise direction. This is resisted by an upward force, caused by air pressure on the port wings and a similar downward force on the starboard wings. If uncorrected this torque couple would turn the aircraft to the left.

The gyrocouple is rather more difficult to explain and I certainly do not intend to go into the mathematics of gyroscopes here. However, if you mount an engine on a board about 12 in. square and run it, you will observe – that if you turn the board sharply to the right, then the right-hand side of the board tries to dip. With a powerful engine you will find this dipping force is very powerful and impossible to resist. Similarly, if you turn the board to the left, the left-hand side of the board lifts. It can therefore be seen that when fitted to a model these forces have an opposite effect to the torque. In a power model the gyroscopic forces are much greater than the torque. In a rubber model, with its slow-revving huge propeller, the torque effect is the greater.

The practical method of overcoming these forces on the F/F power model is to apply right sidethrust to the engine and turn the aeroplane to the left under power. The amount of sidethrust can only usually be determined by practical trimming. In general the average biplane with medium power likes about 2 deg. or 3 deg. More powerful and fast-flying aircraft require more sidethrust By turning to the left the inside wing is always being dragged up by the gyrocouple. Turns to the right under power usually end in disaster as the gyrocouple digs the inside wing further and further down so that eventually the model spirals into the ground. Models with a high degree of lateral stability, such as the Jüngmann, will turn in wide circles to the right but the risk of a spiral is always there.

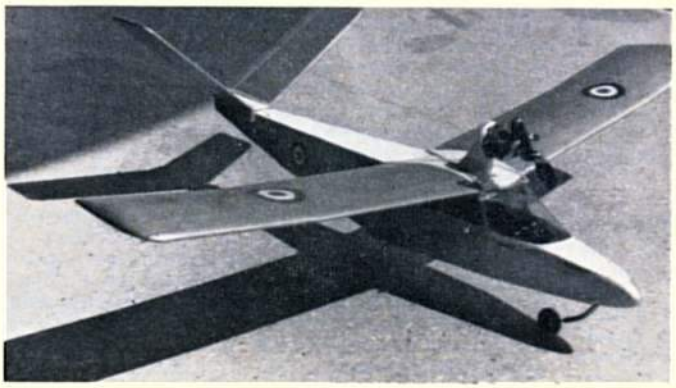
Well, that concludes our brief look at the problem of stability and the ways in which we try and make the natural forces keep our model flying on an even keel. So far I have not mentioned the use of pendulums as an aid to natural stability. I must be quite frank here and say I do not think much of them. I have experimented with them on two models many years ago and found them more trouble than they are worth. Nevertheless several prominent scale modellers have appeared to use them with success in the past, notably the late P. E. Norman and more recently John Simmance. My own thoughts, for what they are worth, are that 90% of scale models fitted with pendulums, fly, despite them, rather than assisted by them. Pendulums can be applied to operate ailerons, rudders or elevators. The linkage to operate the latter two controls being more simple than that to ailerons has resulted in their greater popularity although, if the system worked as intended, aileron control should be the best. The idea of pendulum control is that irrespective of the attitude the aeroplane gets itself into, the pendulum will always hang vertically, linkage between the pendulum being arranged to apply corrective forces to the appropriate flying control to bring the aeroplane back to an even keel again.

All this works perfectly – when the aeroplane is held stationary and rotated about its various axis. Unfortunately, when flying, the pendulum is also subjected to various inertia forces, apart from gravity, which upsets the idea somewhat. The first of these is apparent when one tries to hand-launch the model. The pendulum moves aft and applies down elevator. Not the ideal control force for a smooth getaway!

Some years ago I discussed the inertia problem with John Simmance. He considered he had overcome the trouble by limiting the amount of control movement to only a few degrees so that it couldn't get the model into any real trouble. If this was the case neither would it get it out of any stability trouble either. I am convinced his models possessed sufficient inherent stability, not only to overcome natural unstabilising forces, but those also applied by the pendulum! I am sure John and a lot more scale modellers would disagree with me. What has been proved, however, is that there are great numbers of aeroplanes that can be made to fly well without any artificial stability means, so why increase a model's complexity and weight.

Next month we shall consider the mechanical aspects of the design of Scale Models.

The DeHavilland Leopard Moth, always a popular subject with excellent inherent stability. Its similar 'brother' design, The Puss Moth, is perhaps slightly more popular by virtue of its larger wing area. A.P.S. Plans FSP 891 (50p) offers a 1/8th scale 52 in. model designed by Fred Longbon.



YOUR THREE CHEECHACK

FOR VERSATILITY and cheapness to build, *Cheechack* would be hard to beat, but why such an unusual name? The answer is that the original models were built while the designer was serving with the R.A.F. in Singapore, and he styled the nose of these pretty little sportsters after the local 'household' lizards of the same name!

The first prototype was for a Jetex P.A.A. Loader unit, and took just three evenings to make. It was designed primarily as a 'different' semi-scale machine, and despite the relatively rugged construction weighed only 2¼ oz. complete. The softly-sprung undercarriage used proved very effective, 'soaking up' landing surfaces most realistically. It also prevents damage, and will provide upright landings on even rough ground.

Initial flight tests were very successful – no trimming problems were encountered, the glide being very flat and the model would hold tight turns if required. This is most useful if flying from small fields as it prevents it from going too far away.

Following this success, two more versions were built – one powered by a Cox Tee Dee .010 mounted on a pylon, and another rubber-powered. These both possessed similar flying characteristics, again being easy to trim and fly. The rubber job was very stable, while the power model was quite lively – needing care with the amount of fuel given to prevent 'flyaways'. The rugged yet light structure has enabled all versions to survive untrimmed prangs without any damage, and these models have been thoroughly flight-proven over the past five years, always providing a popular attraction due to their novel appearance. Interchangeability of the components allow a variety of models to be flown, according to one's particular whims!

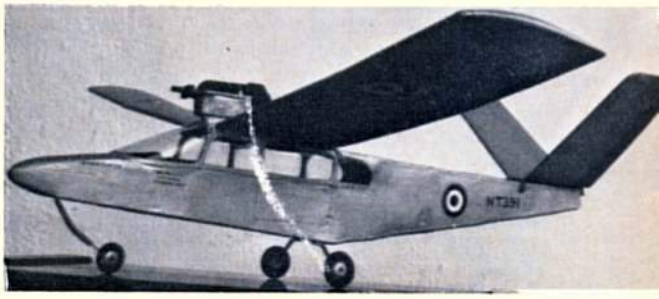
The fuselages for the Jetex and Tee Dee-powered versions are identical, while the rubber-powered model is slightly modified. Select the longerons from evenly matched 3/32 in. sq. medium hard balsa to prevent warping the fuselage. Protect the plan by covering with thin polythene sheet, and then cut the longerons to size, pinning them to the plan with pins either side of the wood – not through, as this would weaken it. Now add the 3/32 in. sq. uprights and sheet gussets. On the R3 (rubber-powered) model, add the sheet reinforcement for the motor peg. When the glue has quite dried, remove and build a duplicate. Cement the 3/32 in. sq. reinforcement pieces at the wing position. Bend the nose leg to shape, then sandwich it between two pieces of 1 mm. ply, using an epoxy or P.V.A. adhesive. Cut out all the crosspieces (noting the different taper on R.3). Then pin the three crosspieces at the wing position in place on the plan view. Invert the fuselage sides and glue them to these crosspieces, using a set square to ensure that they are truly vertical. When dry, add the corresponding pieces to the bottom of the fuselage, thus forming a rectangular box. Again, leave to set, then bring the nose together around the undercarriage former and join the fuselage ends for the J1 and P2 versions. Insert the crosspieces at the tail for the rubber-powered model. Check that the fuselage is not warped, then add remaining crosspieces top and bottom. Finally, sheet in the rear bay of the R3 fuselage.

Cut out the formers F1 and F2, glue in position, and add the stringers. Fill in the bottom of the fuselage where shown with 3/32 in. sheet, and glue the nose block in position. Carve and sand this to shape, then hollow out to accept noseweight. Leave open on the underside temporarily. Bend the 20 s.w.g. undercarriage to shape, then cut out the 3/32 in. sheet u/c mounting floor to shape. Sandwich the u/c between two pieces of 1 mm. ply, using an epoxy adhesive, then glue the ply to the floor piece. The whole unit may then be glued in place. Using the pattern provided, cut the acetate sheet for the cockpit and windows to size, and glue in place.

For the rubber version, make up the noseblock as shown, and cross laminate two 2-bladed propellers to form a four-bladed pusher. Make the tailplane from 3/32 in. medium soft balsa. Cut the centre section out, bevel the edges, and glue the 'V' portions on, to provide 3¼ in. dihedral under each tip. Cement this joint thoroughly. Hinge the elevators, if used, with thin aluminium strips so that they may be altered for trimming, but will not move accidentally.

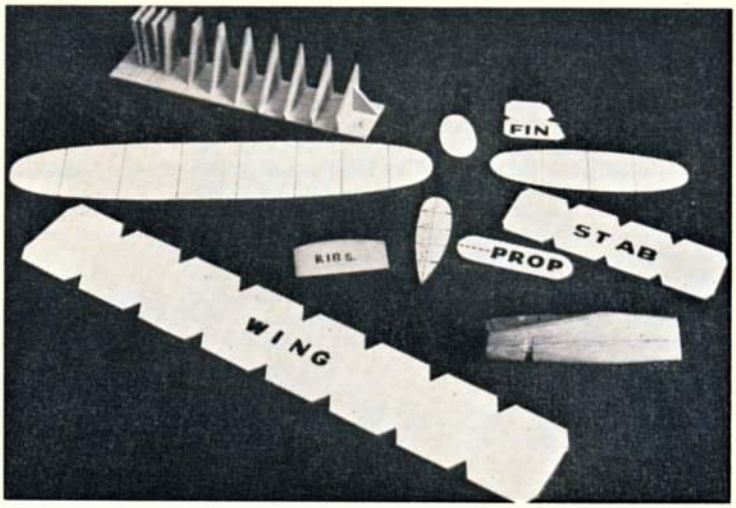
Cut out all the wing ribs from medium-soft quarter grain wood, noting that the R3 version uses ribs W2 throughout. Pin the preshaped leading and trailing edges for one wing panel over the plan, together with the lower spar. Glue all the ribs in position,

Continued on page 201



FREE PLANS

. . . a triple purpose sports flier for Jetex, Rubber drive or Power designed by T. E. DODDS



plus Little Willie

designed by Stewart Howard and Bruce Edwards

THE 'EASY B' type of model makes an ideal beginner's introduction to indoor modelling as well as being a great 'fun' model for the more experienced. As it is capable of flights in excess of ten minutes, it is certainly not a toy. To keep the competition class within reach of the tyro, we have stuck to the spirit of the original rules, that is: –

1. *Maximum wing span 18 in. flat, not projected.*
2. *Maximum wing chord 3 in.*
3. *No curved surfaces or spar bending – rectangles only.*
4. *Tissue covering only – no microfilm.*
5. *No bracing.*
6. *Solid motor stick, tail boom and prop blades.*

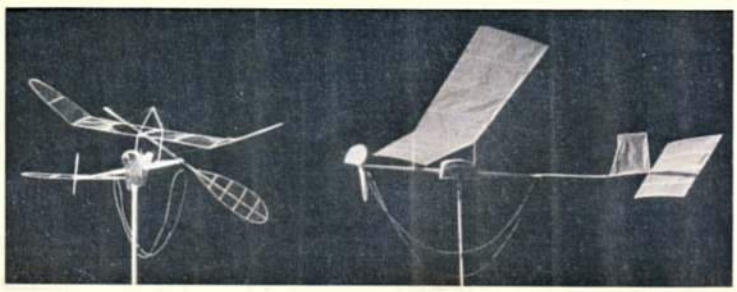
Stewart and I got together on the design while looking for a suitable project for young nephews, and have been pleasantly surprised at the performance of the models built. Over the past three months my model has been used to give flying exhibitions in schools and youth clubs and is still going strong. The only difference being that the rudder has been mounted upright in front of the stab to save it from damage in cluttered rooms.

The Propeller

This is the most important part of any rubber model, so we will start here. If this is a first model, the easiest way to make a propeller is to cut out two blades and a spar. Bend the prop shaft and cement to the spar. Line the shaft up vertically and glue on a blade at 45° in such a way that the front of the blade on the left hand side of the spar slopes *upwards* towards you, then glue on the other blade to the right hand side so that the back slopes *downwards*. When the propeller turns anti-clockwise you should feel a draught on the same side as the shaft. For the more experienced or ambitious builder a jig is carved from block, as shown on the plan, the blades soaked for a few minutes in hot water, then individually strapped to the jig with strips of tissue and baked in a cool oven (Regulo ¼) for 10-15 minutes. When both blades are dry and shaped, one is laid on the jig with the datum lines corresponding and the prop spar glued in place, so that the shaft is vertical and parallel to the corner of the jig. Use white P.V.A. glue for this job, using as little as possible. When dry, remove and repeat for the other blade.

Wing and Tailplane

To cut ribs to shape you need a template. Either trace the rib curve from the plan on to a piece of 1/32 in. ply or find an old 12 in. record or dish which you can cut round. Make the compression rib as shown on the plan. If you use the arc section the upright must be in the middle. Templates can be used for building round. These are best made by tracing the *inside* lines on to card or balsa sheet and cutting out. It is best to cut a 'V' in the template where the ribs go, so that the ribs can be glued in over the former. Cut ribs from a rectangle of 1/32 in. sheet 3¼ in. wide. The same section is used for both wing and stab. Ribs are trimmed to length from the trailing edge. It will be noted that the port wing panel is longer than the starboard. This is because indoor models turn with the motor torque to the left, and this provides more lift to the inside wing, enabling



Heading picture shows the jigs and templates used in building indoor models, which make the job much easier. In the background is a jig for a built-up prop, with triangular templates at one-inch intervals along the blade. This system is not suitable for sheet props.

Right: 35 cm. Puck and 18 in. 'Easy B' Little Willie ready for demonstration flights in a school room. As both models are capable of flights of over three minutes in sites under 12 ft. ceiling, it is quite easy to keep one or both models in the air while talking, and answering questions.

the model to turn tighter. When dry, the dihedral is set in, the compression rib added and this component is now ready for covering. Build tail in the same way. Fin is built flat by cracking a strip of wood around the template and gluing it after it is removed.

Motor stick and tail boom are self-explanatory. Wing mount tubes are made by wrapping a ¼ in. square of tissue around a 1/16 in. drill shank which has been dipped in dope. As soon as the tissue has been rolled on to the drill, slide the tube off the former and allow it to dry. If it dries on the drill you will have to cut it off and start again!

These are not glued to the model till you know exactly where your wing is going. Front bearing and rear hook are cemented firmly in position on the motor stick, then the tailboom and fillet are added.

Covering

Condenser paper, Jap tissue, 'Shoebox' tissue or lightweight Modelspan may be used, in that order of preference. Cover top side only of wing and stab, and left hand side of fin. It is best to pre-shrink the tissue first by placing it on a damp sheet of newspaper, then iron out the wrinkles with a warm iron when dry. This gives the tissue a 'waffle' appearance. Use condenser paper cement or dilute P.V.A. as an adhesive. Lay tissue on model, do not stretch. After covering and trimming, glue the rear wing post in position so that it bisects the reflex angle formed by the dihedral. Support the wing tips so that the right hand panel is flat and unwarped. Prop up the leading edge tip of the left hand panel 3/16 in. as shown on the plan and glue on the front post so that it leans fractionally towards the right wing. Glue stab and rudder to tail boom with the tilt and offset shown on plan. Slip a washer on to prop shaft and prop on to stick. Hang a 8 in. loop of ¼ in. rubber between hooks. Balance and mark. Measure 1½ in. each side of balance point and glue on your two ¼ in. wing mount tubes to the left side of motor stick level with the base line. Make up a loop of ·045 in. rubber about 12 in. long and you are ready to go.

Flying

If the model dives, push rear post deeper into tube or bend up the boom. If the model climbs and stalls, reverse above. To the make model turn tighter, bend fin round. If left wing drops and model dives in, crack up left hand leading edge to increase wash-in. Model climb steepens and starts to go right, decrease wash-in. Model crabs along straight, decrease wash-in slightly and add more rudder. Motor fully unwinds in air, increase length, 'sick' and lacking power, use same length of thicker rubber – ·050 in. You need an area of about 20 ft. sq. with a 'clean' ceiling for really good flights. Indoor tissue, hardware and rubber are now available in this country, they make the job much easier.

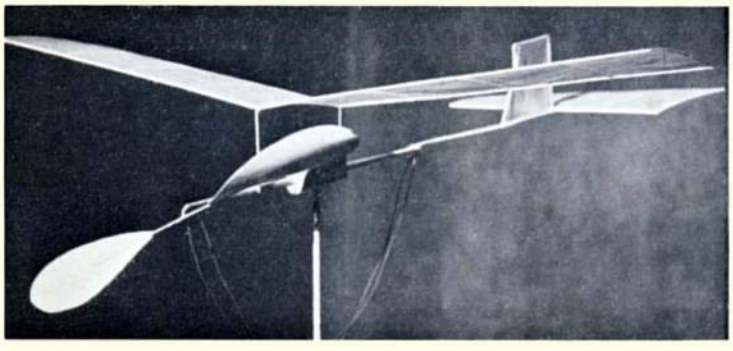
. . . and PUCK

a half-size microfilm covered miniature for indoor flying by B. Edwards

THIS IS A half-size International class 65 cm high performance model and as such is capable of producing excellent high performance flights when built down to minimum weight. The weight range should be between 0·005 and 0·010 oz. To get down to the lower limit with a model strong enough to be handled and flown will depend on your experience and ability. The entire model is built of wood in the 4-4½ lb./cu. ft. density range. Indoor materials are now available in this country, so that there should not be any difficulty in obtaining the correct materials. Wood sizes shown are for guidance only and represent a 'middle road' rather than the ultimate, except in the case of the motor stick thickness.

Start by cutting templates for the wing, stab, fin and prop blade out of cardboard or balsa sheet. Trace the outlines directly on to your building board and pin templates in position over these. Soak your spars then pin them around the templates, using small cubes of scrap balsa to hold them in position. The prop blades are also built flat. When the outlines are properly dry, remove templates and glue joints with thinned cement or 'indoor glue'. One template curve does for all ribs – wing, stab and prop. Cut out and cement ribs in position, remembering that you need three deep ribs for the wing at points marked X and X'. These take the place of compression ribs and are lighter. Motor stick blank is cut from sheet then soaked and wrapped around a 3/16 in. dia. former with tissue. Bake in a cool oven for 10-15 minutes (Regulo ½). Cement seam, making sure it is straight. Bend rear hook to shape and glue to rear web. The webs go *RIGHT THROUGH* the stick. Cut nose back at an angle of 45°, add end cap, bracing post and front bearing.

Cut a slot in the prop jig, 4½ in. from the tip, so that the shaft is vertical, and groove the 'Datum Line' to take the spar. Mark the spar position on your prop ribs and tip. Assemble, making sure the blade



Little Willie in its run-down stand. Note wash-in on left wing. Forward-mounted upright fin used to prevent damage, but is not quite as effective in this position.

conforms to the jig shape, wet and place on top of a heater to dry then repeat for other blade.

Cover surfaces in a semi-taut microfilm such as 'Micro-X Black Label', which has been allowed to age for about a week. Crack dihedral into wings and cement on small blocks for bracing where this touches the L.E. and T.E. Add cabane and wing posts. Cement stab and rudder to tail boom, then, tilting motor stick 45°, so that the bracing post is to the *right*, cement tail boom into stick – remember the stab tilt! Place wing in a suitable jig and brace. Assemble fuselage and prop, add motor and find C.G. Insert wing mount tubes, being careful not to split the stick while doing so.

Power is dependent on weight. A good starting point would be a 12 in. loop of ·025 in. for low ceiling work and about 12 in. of ·020 in. for high ceiling flying. It is useful to have several propellers, ranging from 18 in. to 22 in. pitch to cover a range of conditions.

Continued from page 198

angling the root rib to suit the dihedral. Add the soft balsa tips and carve to shape. Repeat this procedure for the opposite panel, then join the two wing halves together, propping up one panel 3 in. to achieve the correct dihedral. On the J1 and P2 versions add the 1/16 in. centre section sheeting as shown.

The J1 variant uses a hard balsa mount for the Jetex unit, to provide a flat, horizontal base. When making the P2 model, cut the ¼ in. x ¼ in. hardwood pylon to shape, then cut into the joined centre ribs at the wing root, and insert. Use a P.V.A. or epoxy glue for strength. Reinforce this joint with hard balsa supports either side. Make a disc of ¼ in. ply (or two laminations of 1 mm. ply) and glue and screw to the pylon. A 1/32 in. ply or plastic spacer is then glued on to this disc.

Carefully sand model, then cover entirely with lightweight tissue (including both sides of the tailplane) and apply three coats of thin dope, taking care not to permit any warps to creep in.

Cement all dowels in position, noting that R3 uses two pins either side of the rear fuselage to attach the tailplane. Colour trim, which should be kept light, may now be added. The original looked most attractive coloured silver overall, with the exception of the nose tip, wing centre section and rear fuselage top which were painted white. R.A.F. markings were also applied. Apply one thin coat of fuel-proofer on the Cox-powered model, but apply at least two coats around the pylon.

The Jetex P.A.A. Loader motor should have an aluminium clip bent to the section shown, screwed to the hard balsa mount, and add some asbestos paper behind the unit over the centre section to prevent accidental fires! Allow 2-degree downthrust, achieved by applying packing under the clip, but do not use sidethrust. Turns may be induced by offsetting the wing slightly, or by adjusting the elevators.

Fix the Cox Tee Dee .010 in place with two woodscrews – the thrustline being altered as required by inserting packing between the tank mount and the firewall. Use short runs of power at first, gradually building up to longer flights, but never overfill the tank, as you may well lose the model! A name and address label is always a worthwhile addition.

For motive power in the R3 version, use six feet of either 3/16 in. or ¼ in. x 1/24 in. rubber (made in two loops) according to preference.

With the model(s) fully assembled and complete with wheels, etc., carefully adjust the C.G. position by adding lead to the weight box in the nose as required. This is then sealed with a piece of scrap balsa, which is then painted to blend in with the finish. That done, you are all set to enliven the local flying field – where you will find that the fine flying performance may well produce a few converts to '*Cheechacking*'!

CONTEST CALENDAR

March 21st **S.M.A.E. AREA CENTRALISED MEETING.** F.A.I. Glider, Open R/P. Area venues.

March 21st **S.M.A.E. CENTRALISED C/L MEETING.** Stunt, Rat Race, Combat, Speed. R.A.F. Cottesmore.

March 21st **EASTCOTE R/C SPOT LANDING COMP.** Spot Landing + nominated time at Eastcote club field, Greenfield, Beds. 10.30 start.

April 11th **ELLIOT SPEED MEET.** All classes (1.5, 2.5 open, F.A.I., 29, 40 and 60) 40 class on 60 ft. lines. At Elliot Bros., Airport Works, Rochester, Kent.

April 11th **N.W. AREA MEETING** at Chetwynd. Open R/G/P and chuck gliders. S.M.A.E. members only.

April 18th **F.A.C.C.T. THERMAL SOARING RALLY** at Enstone, Oxon. 10 a.m. start, field entry.

April 25th **LONDON AREA C/L CHAMPS.** Stunt and Junior stunt – silencers obligatory, at Fairmile Common, Esher, Surrey. Details from W. J. Chapman, 55 Langdale Avenue, Mitcham, Surrey.

April 25th **S.M.A.E. AREA CENTRALISED MEETING.** F.A.I. Power, Open R/G. Area Venues.

April 25th **NORTHERN AREA PYLON RACE MEETING,** R.A.F. Topcliffe, Yorks. F.A.I. & Formula 1 (S.M.A.E. members only).

April 25th **LUTON D.M.A.S. SLOPE SOARING RALLY,** Ivinghoe Beacon, Single Channel with Spot Landing, Multi Aerobatics. Pre-entry forms (pre-entry essential) to T. Clark, 'Windyridge', 126 Alexandra Avenue, Luton, Beds. Telephone 22742.

May 2nd **ELLIOT M.E.C. C/L RALLY.** Goodyear (2.5 c.c. max) Stunt, F.A.I. T/R, Combat. 15p (3/-) pre-entry to C. Atkins of 12 Hillcrest Road, Chatham, Kent. 25p (5/-) on field.

May 2nd **NORTHERN AREA VINTAGE COMP.** at Topcliffe. S.M.A.E. members only.

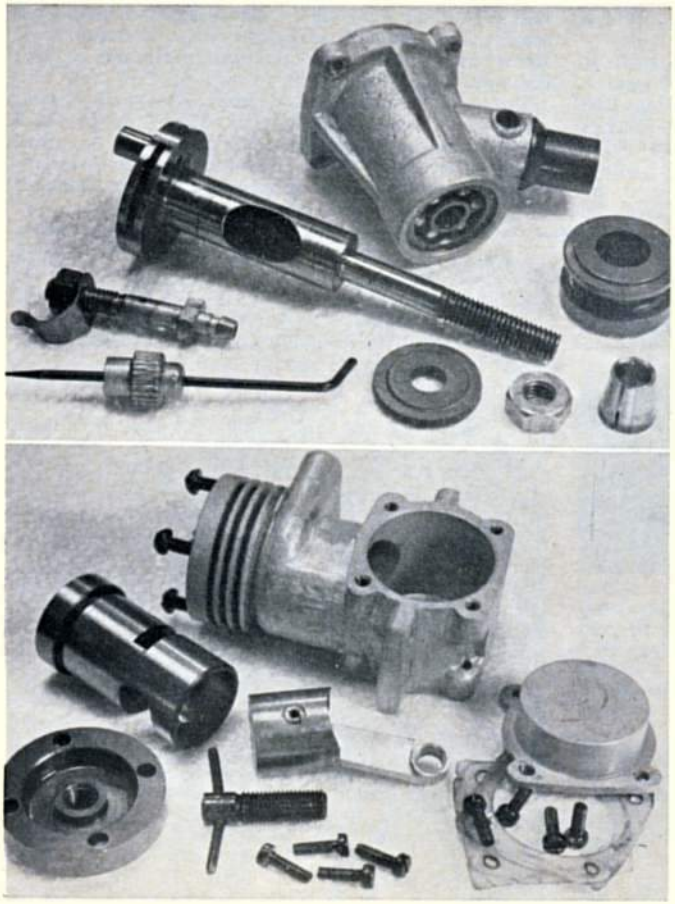
May 9th **THREE KINGS C/L OPEN STUNT** and **SCALE MEET,** at Croydon Airport, silencers obligatory. Details from D. G. Woods, 133 Ravensbury Road, Southfields, London, S.W.18. Tel. 01-947 0752. 10 a.m. start.

May 9th **NORTH LONDON R/C M.F.C.** Open Fun-Fly meeting (Aerobatic schedule). Restricted to competitors and their families, Baldock, Herts.

May 16th **MIDLAND AREA RALLY,** Barkston Heath. (S.M.A.E. only).

May 16th **ST. ALBANS M.A.C. THERMAL SOARING RALLY,** at Nomansland Common, Wheathampstead, 10.30 start. No super regen.

May 30th/31st **BRITISH NATIONALS** at R.A.F. Hullavington, Wilts.



LATEST ENGINE NEWS

by Peter Chinn

Left, parts of the dismantled CSKAM-1 reveal rather poor workmanship – note in particular the 'hand-filed' con-rod and porous crankcase. Crankpin is counterbalanced by slots milled around periphery of crank disc.

CSKAM-1 Diesel

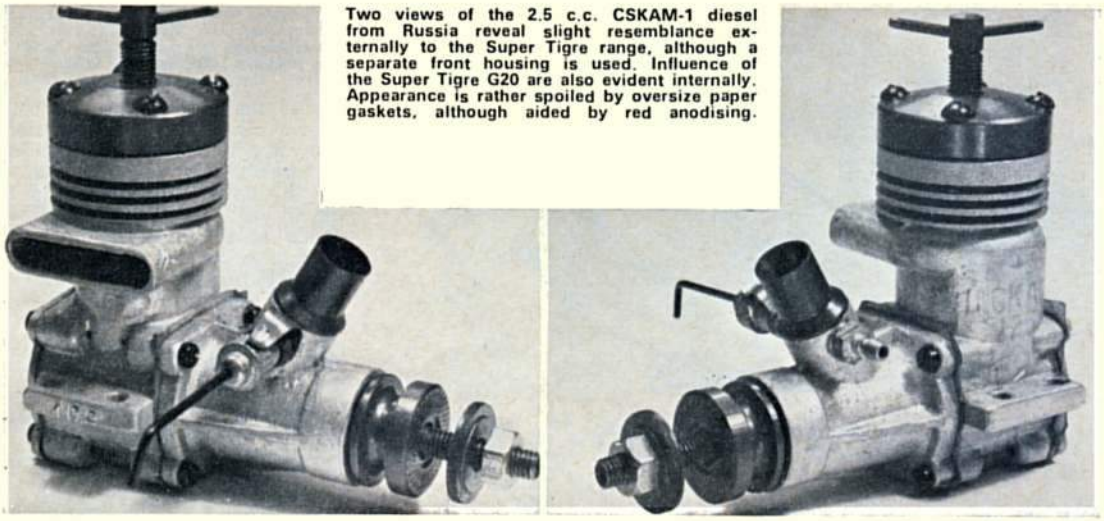
This engine, made in Russia, gets its name from the initials of the Central Sport Klub for Aero Modelling in Moscow, where it is manufactured. The CSKAM, incidentally, is also responsible for the *Akrobat* 7 c.c. C/L stunt engine, which appeared for the first time last year, and was used by the entire USSR aerobatics team at the 1970 World Control-line Championships at Namur.

Neither engine (we also have an *Akrobat* and will be describing it later in L.E.N.) is impressive as regards standards of construction and finish, but the CSKAM-1 is, perhaps, a little better than some other Russian engines produced to date. As we have remarked before, none of the motors available to the ordinary Russian modeller (or, for that matter, to the modellers of other East European countries) is, at the present time, comparable with the quality of the better model engines produced in Great Britain, the United States, Japan, Germany, Italy, etc.

The CSKAM-1 is a 2·474 c.c. compression-ignition engine with shaft rotary valve induction and twin ball bearings. There is just a hint of Super-Tigre G.20 in its appearance, and closer examination confirms that it has several features suggesting a certain amount of Super-Tigre influence.

One way in which the CSKAM-1 differs from all recent 2·5 c.c. Super-Tigres is its use of a front housing separate from the main body of the engine. The main casting comprises crankcase and cylinder casing and is fitted with a drop-in steel cylinder-liner. Like the ST (and many other current 2·5 c.c. motors), it has a 15 mm x 14 mm bore and stroke and cross-scavenging with flat-crown deflectorless piston and almost simultaneous opening of the exhaust and transfer ports. The transfer port is very deep and is inclined through the cylinder wall but, unlike the ST port, is not divided into two. The lapped cast-iron piston has its skirt cut away front and rear to clear the crankweb and crankcase backplate, as on the Super-Tigre, but a pressed-in solid gudgeon-pin is used. The unbushed aluminium conrod appears to be hand-filed to shape. The contra-piston has a flat under-surface and the cylinder assembly is secured by a machined and anodised aluminium head fixed to the casting with four screws. It is topped by a 6 mm compression screw.

Crankshaft dimensions are much the same as those of the ST: a 10 mm dia. main journal, 5 mm dia. front end and 5 mm crankpin, but the gas passage through the shaft is somewhat smaller, at 6·5 mm bore. Counter-balancing of the crankpin is by means of slots milled in the periphery of the crank disc. The shaft runs in brass caged ball journal bearings of Russian manufacture installed in a



Two views of the 2.5 c.c. CSKAM-1 diesel from Russia reveal slight resemblance externally to the Super Tigre range, although a separate front housing is used. Influence of the Super Tigre G20 are also evident internally. Appearance is rather spoiled by oversize paper gaskets, although aided by red anodising.

cast aluminium housing that is attached to the crankcase with four screws and incorporates the usual shaft-valve intake boss. A 6 mm i.d. machined aluminium intake venturi is used, held in place by a 4 mm dia. spraybar.

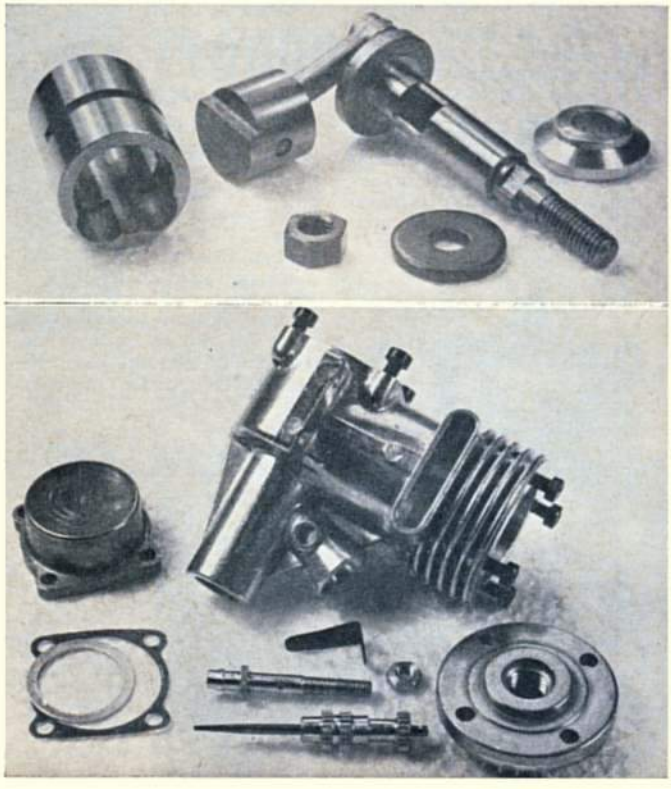
Although outwards, the CSKAM-1 could be a little neater (for example, the paper gaskets used between the front housing, crankcase and backplate are very roughly cut to shape and their edges protrude untidily), the engine is not of unpleasing appearance, the casting being relieved by red colour anodised machined parts, i.e. cylinder-head, air-intake, prop driver and prop nut. Checked weight of our example is 192·5 grammes or 6·79 oz.

Entirely new O.S. Pet

At a recent meeting with Mr. Ogawa, owner of the big O.S. company of Japan, we were handed one of the first production samples of the new Series III version of the *O.S. Pet* engine. Quite a lot of the earlier models of this lowest-priced O.S. engine have been sold in the U.K. by Keilkraft, and supplies of the latest version should be reaching KK stockists in a month or two.

The original Pet design dates back some 12 years, so it is not surprising to find that the Pet-III is not simply an updated version but a completely new engine. It is, of course, still aimed at the same popular market (beginners and sport flyers), but incorporates many improvements and, styled to bear some external resemblance to the bigger O.S. Max engines, looks rather more 'grown-up'.

The most obvious change is the new main casting, which now includes a finned full-length cylinder casing instead of terminating just above the exhaust port. As before, the crankcase material serves as the main bearing, but there is now a shallow longitudinal oil groove in the bearing surface, strategically placed to feed lubricant under crankcase compression to the bearing where it is most needed. The casting is quite extensively



Layout of the parts for the latest O.S. Pet reveal extensive machining in such a low-priced motor. An oilway is now provided for the main bearing to prolong its life.

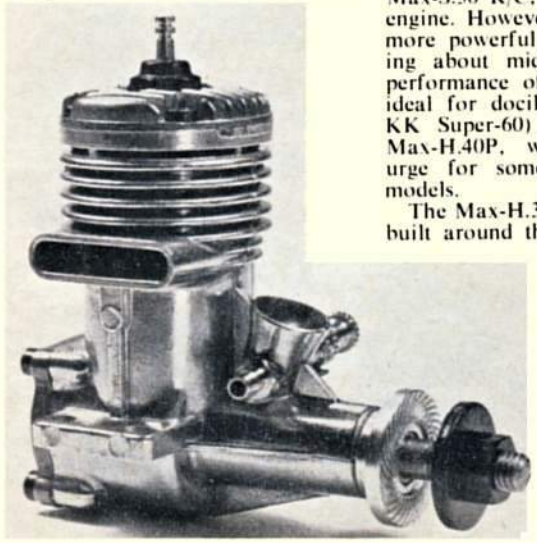
Until now, O.S. have not provided a silencer for their 'Pet' series. Situation is rectified by this simple unit, retained by passing the spring around the cylinder.

machined for a low-priced engine.

In place of the older integrally-finned cylinder, the Pet-III has a drop-in liner and instead of the usual type of O.S. porting, internal flute type transfer ports are used. The liner is located by a narrow machined annular seat in the crankcase and is clamped axially between this and the cylinder-head. Four screws secure the head to the main casting and, in place of the older engine's vulnerable composition gaskets under the cylinder-head and base, a single 0·3 mm soft aluminium head gasket is used.

The piston, as before, has a step type deflector and is coupled to a diecast aluminium connecting-rod by a 3 mm fully-floating solid gudgeon-pin but is fractionally lighter and the conrod now has a bronze bushed big-end. The dimensions of the hardened steel crankshaft are much the same as those of previous Pets: an 8 mm dia. main journal, 5·5 mm bore gas passage and 4 mm crankpin. A machined dural prop driver keyed to a flat on the shaft is used in place of the earlier steel item.

O.S. were among the first model engine manufacturers to offer silencers for their engines, but these did not include one suitable for the Pet-I and Pet-II. This omission has now been made good with the Pet-III, for which O.S. are making a neat pressure diecast expansion chamber that fits on to the engine's exhaust duct and is held by a simple spring retainer. It includes a screw-in brass nozzle through which the engine can be primed for cold starting.



Production version of the entirely new O.S. Pet III 1.6 c.c. glowplug engine. An R/C version with simple throttle unit will also be available.

O.S. Max-H.35 R/C

Although this engine has been on the market for some time, we have not previously had an example through our hands. In the O.S. catalogue it is listed, like the Max-S.30 R/C, as a 'multi-trainer' engine. However, it is quite a bit more powerful than the S.30, being about mid-way between the performance of the 30 (which is ideal for docile trainers like the KK Super-60) and the very hot Max-H.40P, which has enough urge for some ·50 to ·60 size models.

The Max-H.35 R/C is, of course, built around the same hefty casting as the H.40 series, complete with a big 13 mm diameter shaft supported in a single ball bearing supplemented by a bronze bush. It has the same basic carburettor as the 40 but with a suitably reduced choke area. It also has the same bore measurement as the 40 (20·6 mm), but, like the 30, uses a lapped Meehanite piston instead of a ringed aluminium one. Its stroke, 17·5 mm, is 1·0 mm less than that of the 40, thereby reducing its capacity from 6·499 c.c. (0·3966 cu. in.) to 5·833 c.c. (0·3559 cu. in.).

O.S. Pet III fitted with newly available silencer. Priming is possible via a screw-in brass nozzle.

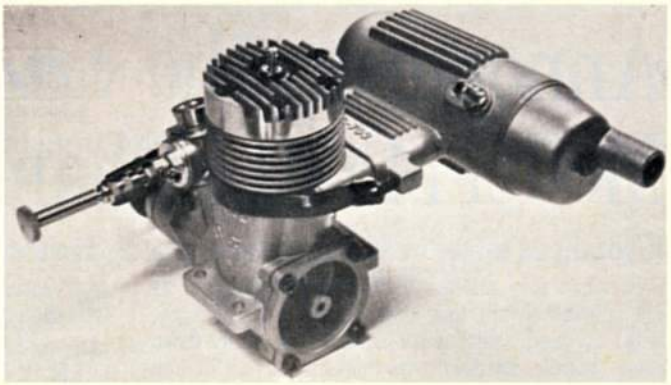
The weight of the H35 R/C, less silencer, is 9.23 oz. It is therefore appreciably heavier than the more compact 30 (very light at only 7.44 oz.) and almost as heavy as the powerful H.40P (9.45 oz.) and some modellers will undoubtedly feel that, if substantially more power is required, the 40 is the logical step upwards from the 30. On the other hand, where cash is a consideration, the 35 at £11.47, is not much more expensive than the 30 (£10.03), whereas the 40P, while very competitively priced among high-performance 40s, is rather more costly at £14.08.

New O.S. Silencers

One of the two photos of the H.35 R/C shows this engine fitted with a new style O.S. silencer that will be on the market in two or three months' time. The particular version shown will fit all current O.S. medium-size engines from the Max-H.29R to the Max-50. It will also fit the now discontinued Max-

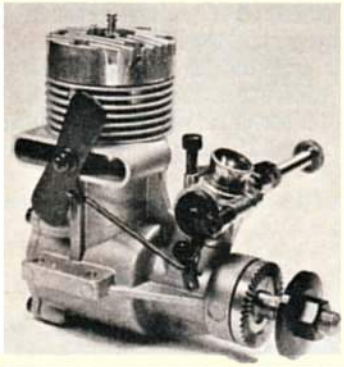
58 and the old Max-III series 29 and 35 engines.

A larger version of this silencer is also being manufactured for the Max-H.60 and 60F and Max-H.80 engines, while a smaller version will be available for the Max-III 15 and Max-19. The existing *Jetstream Type L* and 60/80 silencers are being withdrawn from production but the Type S (small, 10/15/19 size) will continue as it is thought that its smaller size makes it more aceptable for the Max-10 engine.



New style O.S. silencer shown fitted to the Max-H.35 R/C. Note outlet for fuel pressurisation system.

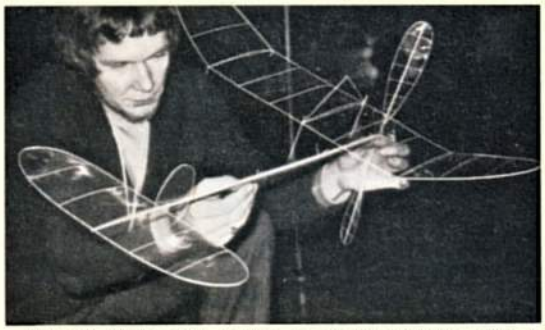
Below, one of the better .35 cu. in. radio-control engines, the O.S. Max-H.35 R/C.



Like Webra, O.S. do not subscribe to the view that, in the absence of any precise F.A.I. ruling as to what constitutes a 'silencer', it is in order for a manufacturer to go all out for power with no regard for effective silencing. For this reason, when developing their new silencers, O.S. dismissed the venturi or extractor type as being too noisy and opted for a large volume expansion chamber.

Each silencer consists of a one-piece aluminium pressure casting comprising the inlet duct and main body, liberally finned, to which is attached an end cap with an offset outlet stub. The cap can be rotated so that the outlet can be positioned to suit the model. A one-piece steel strap and single screw secures the silencer to the engine and each is provided with a brass nozzle for port priming. A screw-in nipple is also supplied with the two larger models to enable the silencer to be used for pressurising the fuel tank.

INDOOR at BRIZE NORTON



Bruce Edwards of Richmond, who was instrumental in the resurgence of indoor interest in the London area, with F.A.I. model.

Through some good liaison by Butch Hadland, who is based at the station, the fine basketball court at R.A.F. Brize Norton has been made available for indoor flying sessions by S.M.A.E. members from time to time. The first of these meetings took place on January 16th and, even though notification was via the indoor grapevine, some twenty models flew there during the course of the evening. The effective ceiling was around thirty feet and times of around thirteen minutes were achieved by some F.A.I. models; in the absence of a steering baloon a few models ended up lodged in the rafters, but in future, given a supply of helium and a steady hand this should be avoidable.

Indoor fans from Bristol and West, Hayes, Leicester, Worcester, Croydon, St. Albans and Richmond were among the arrivals and although not a contest evening, some useful flying was obtained with the 65 cm. F.A.I. models and with tissue covered types. The techniques involved with models weighing around .03 of an ounce all up and braced with nichrome wire under .001 of an inch thick are challenging enough to make several outdoor free-flight men start thinking about the autumn team selection Trials for the 1972 World Indoor Championships. Besides, walking in plimsolls on a polished wooden floor as if it was covered in eggshells, is quite a change from tramping across the swamps of Chobham Common.

Details of future indoor meetings can be obtained from the Chairman of the S.M.A.E. indoor sub-committee, Stan Wade, at 39 Beacon Drive, Loughborough, Leics. Special indoor model supplies, wood and rubber can be obtained from Laurie Barr, who advertises in this magazine.

St. Albans junior Martin Shepard and F.A.I. model.

Announcing the BiC Regd. Trade Mark National Model Making Championship

If you have a few used ball pens and a creative mind . . . prove it!

Even when they are the world's finest ballpens, as Bic undoubtedly are, they have to run out of ink sometime! For years a further use has been sought for those empty barrels, destined after gallant service to end their days in sideboard or office desk, side by side with less worthy writing instruments.

And here is the answer!

Because Bic Crystals write first time every time there are far more sold in the U.K. than any other model. In fact, each year a Bic Crystal is sold for every man, woman and child in the Country with a few million more for good luck.

Where do they go to?

It is human nature to squeeze the last drop of ink from a ballpen or to believe that it may write again after a short rest. This is why you will probably find more than you expect in your own home. In offices and factories you should find them by the hundred.

All you have to do . . .

. . . is to start collecting used Bic Crystal medium and fine ballpens now so that you may complete a suitable model and enter the competition.

There will be cash prizes for the best models every three months, both senior and junior and finally the best modeller overall at the end of the year will be awarded a further cash prize of £250 and the handsome Bic championship trophy.

Take your time, read the rules overleaf, then send your model with coupon.

This is a simple example of what can be made out of approximately 50 Bic Crystal ballpens with accepted accessories such as rubber wheels!

BiC Regd. Trade Mark

the pen they model on

GOLDEN WINGS AEROMODELLER MODEL CLUB

The club for 10 to 16 years old

JUNIOR KIT CONTEST

GREAT NEWS for all *Golden Wingers* (and indeed all those under the age of 16) is that the S.M.A.E. will be organising two competition classes specifically designed for them at this year's British Nationals.

On Sunday, May 30th the *Junior Kit Contest*, which proved so popular last year, will again be held. The rules are essentially the same as before, although there is now a larger selection of kits to choose from, and auto-rudders as well as dethemalisers may be fitted, even when not specified in the original kit. To refresh your memories, and for the benefit of new readers, the basic rules are:

1. Models must have been built entirely by the entrant from a kit and must be chosen from the following kits only. (More than one model per entrant per section is allowed if required.)
   Rubber. KeilKraft *Ajax* and *Senator*, Mercury *Mentor*, Veron *Sentinel*, Performance Kits *Kingfisher*.
   Glider. KeilKraft *Invader*, Mercury *Martin* and *Swan*, Veron *Verosonic*, *Cirrosonic*. Performance Kits *Owl*, *Cosmic Wind*.
2. Entrants must wind and launch their rubber models and operate the towline on glider models – towline length will be 50 metres (164 ft.) maximum.
3. Only one entry per person per section is allowed.

For this event, third party insurance cover is not required—it will be included in the cost of the entry fee. Further details will be announced next month, but in the meantime any enquiries may be addressed to the organiser, Mr. R. A. Favre, of 90 Courtlands Drive, Watford, Herts., WD1 3JA, enclosing a stamped addressed envelope and marking the outer envelope with 'Kit Contest'.

The second competition, to be held on Monday 31st May, is aimed at the control line enthusiast, and as you can see a handicap system is provided to even-out the flying scores, so that a young pilot can compete on even terms with a more experienced one. The rules, which are still provisional (although they will not be changed to any large degree) are as follows:

1. No model or engine size restriction. Model must withstand a 10G pull test (i.e. ten times weight of the model), and may be flown on lines up to 60 ft. (max.) long.
2. Event will be held over grass, so any launching method may be used – wheels are not necessary.
3. Each competitor will be allowed two flights, the best single flight score counting. Two attempts of 2 minutes duration per flight will be permitted to get airborne.
4. Manoeuvres. (a) Four laps level flight, K=2. (b) Wing-over, K=4. (c) Three consecutive loops, K=1, 2 & 3. (d) Four laps inverted flight K=4. (e) Three outside loops, K=1, 2 & 3. (f) Horizontal eight, K=4. (g) Vertical eight, K=5. (h) Overhead eight, K=5. Each manoeuvre is marked out of 10, then is multiplied by the K or 'difficulty' factor.
5. No appearance, take-off or landing points will be awarded. Five minutes is allowed for the schedule, including time for two full laps between each manoeuvre.
6. A handicap system will be used based on the age of the competitor. A competitor aged 10 or under would receive 100%, 5% would be deducted for each year over the age of 10 (i.e. a 16 year old would receive 70% of his score).

Any further queries on this contest should be addressed to Mr. N. J. Chapman, 55 Langdale Avenue, Mitcham, Surrey, who is organising this event. Please enclose s.a.e.

It should be noted that third party insurance cover (either S.M.A.E. or M.A.P. will do fine) is essential for this event.

Both contest are eligible to anyone whose 17th birthday falls after 30th May 1971. Further details concerning prizes and contest procedure will be announced next month.

free flight comment

JOHN O'DONNELL

In Spring, a phree phlighter's phancy turns to thoughts of the new contest season and new models . . . or repairs to last year's old faithfuls

The repair job your columnist won't forget! Here John is seen in the back of his Cortina estate car repairing his open rubber *Maxine* fuselage for the 1970 Nationals flyoff. About 12 inches of the centre fuselage were absolute matchwood, but the effort was rewarded with a third place in the flyoff, following an O.O.S. in-lift flight, as well as helping him to win the Houlberg trophy.

ABOUT THIS TIME of year, the prospects of better, or at least warmer weather cause most modellers to think in terms of regular flying once again. This, in turn, often brings the realisation that they have very little to fly! Although the winter might be the most suitable time to spend hours at the building board, it nevertheless appears that many aero-modellers are 'fliers' rather than 'builders'. In short, they need the incentive of flying before they will build. This even applies to the contest enthusiast who may be far from ready for the new season. After all, the first event of the S.M.A.E.'s 1971 programme is to be held within a few days of the appearance of this issue in the news-stands and model shops.

Notwithstanding the above, most modellers' homes are well furnished with many models – or rather, the bits and pieces thereof. Few people would deny that models take longer to make than to break – or that most models are doomed to ultimate destruction! Perhaps it is a reflection upon the 'throwaway age' in which we live that there is such a common and marked reluctance to mend what is broken. That it is so prevalent amongst modellers is all the more surprising, as they must appreciate not only how much work has gone into a broken model, but also how it was made – and hence by implication how it could be repaired. There is obviously less appeal in renovation than in new construction – but the former is usually accomplished in a fraction of the time.

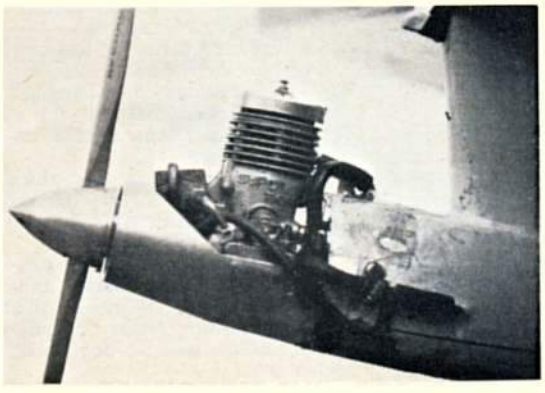
Developments in the free-flight side of modelling are far from being so rapid that 'last year's model' is obsolete or no longer competitive. In fact, *model* development (as distinct from flying techniques or engine tuning) has made very slow progress in some categories in recent years. This means that good reliable models are, or should be, worth even extensive repairs. As I have become noted (or criticised!?) for flying the same models 'year in and year out', perhaps I can offer some guidelines. It should not be supposed that my models lead 'charmed lives' in that they are never broken or lost! As I will compete in rougher weather than most, I certainly have my share of troubles.

Practically all breakages can be repaired, if one wishes. In a few cases the affected component requires replacement, or conversely the *surviving* components can be used as the next model! I won't pretend that even first-class repairs can be classed as 'invisible mending', but they do not show in the model's performance. Weight inevitably creeps up with age and repairs, but these are usually compensated by the added experience and trim refinements that result from more flying with the same model.

Before going on to deal with specific repair techniques, it would be as well to reiterate that prevention is better than cure. The groundwork necessary for good repairs, requires to be provided during construction. A model needs to be designed well, and constructed well, *before* it can be expected to repair well. Attention to the niceties of structural design, and careful wood selection will pay handsome dividends in the way of reduced susceptibility to damage. Furthermore, careful workmanship in the sense of well-fitting joints and properly stuck together components will help in preventing a repair job from extending into a major maintenance exercise.

To digress for a moment. A good many years ago, my club members hotly debated the theory that the better-built models should fly best. Conclusions, based on practical experience, were a little surprising. Providing that certain

Quick-setting epoxy showed its prowess at the 1968 trials (to select the '69 team) when Dave Wiseman had his engine, mount and bulkhead shear off the front of his power model fuselage. It was simply glued back on, without affecting trims.



Three models are allowed for F.A.I. events – both at home and abroad. Here Martin Dilly shows he was ready for almost any contingency!

basic essentials were correct, then craftsmanship did *not* seem reflected in performance – but was apparent in how well the model retained its trim, and whether it 'fell to pieces' when it hit something. In other words, it flew as well, but didn't last. I have remained convinced that these deductions were correct – and that the 'long term policy' was the better of the alternatives.

Repairs themselves can be divided into two basic, and very different categories. These can be described as *'field repairs'* and *'home* (or workshop) *repairs'*. The distinction is far from academic, as the two types of repair are usually intended to produce different results and call for very different methods.

Field repairs are intended by their very concept to be such as to render a model sufficiently airworthy to complete the day's flying. As the means necessary to attain this end in the time available are often extremely rough and ready, I would maintain that such field repairs should, therefore, be envisaged before the model's next outing. Failure to accept this principle can lead to a model becoming prematurely aged and decrepit.

The regarding of field repairs as merely stop-gaps can, in fact, be taken a stage further. Whilst the field repair must obviously be adequate to withstand the subsequent launch and flight, it does not necessarily need to withstand landing! Sidestepping the measures necessary to make the repair itself crash-resistant, can make matters very much simpler and quicker.

It is possible merely to stick back together a dislodged wing tip, fin, underfin, and the like – and omit all bracing at the joint. Such a repair is unlikely to survive a cartwheel landing – but it possesses the additional virtue of not complicating subsequent repair operations at home. For similar reasons when bracing is appropriate (*i.e.* when the repair is stressed by launch or flight loads) it is often better fitted *externally* over the fractures. Such a technique does not look neat, but it can save considerable time on the field, and the external braces can be removed comparatively easily afterwards.

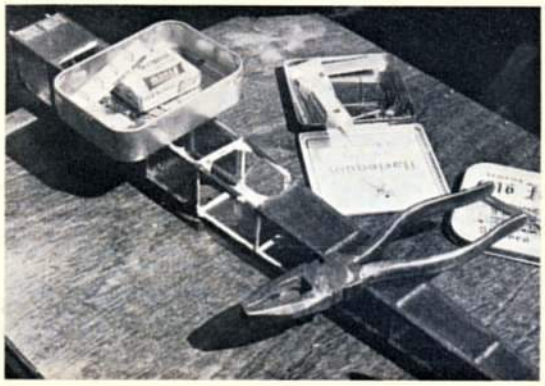
When a joint is reinforced, it should be done so that the brace itself is about as strong as the original component, *i.e.* a break in a spar or longeron should be strengthened by a piece of wood of similar size and hardness. Such a brace should extend sufficiently each side of the joint to enable it to become loadbearing. Perhaps, the accompanying sketches will help make this clear.

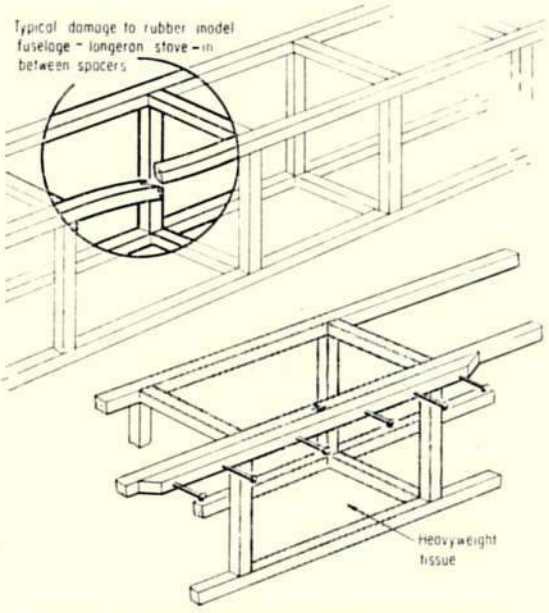
Quick repairs have been rendered much more practical by the recent availability of *'5-minute epoxies'* and similar quick-setting adhesives. These are much easier to use and give better results than earlier attempts to employ polyester resins intended for reinforcing glasscloth, or even proprietary car-repair materials.

Properly used, and this includes thorough mixing of the correct proportions of the mixture, even the quick-setting epoxies are very strong. It has been demonstrated that broken power model fuselages can be glued back together, without bracing and without troubles.

An even more recent development in the adhesive line would appear to hold much promise. Cyanoacrylate adhesives, that set in a matter of seconds when in a thin film in the absence of air, have now appeared as commercially-marketed products. They require care in use, as they will stick to skin in a manner that could be dangerous, and are very expensive (about £2 per 20 grams for one product). Nevertheless, they are certain to find applications in more ways than one.

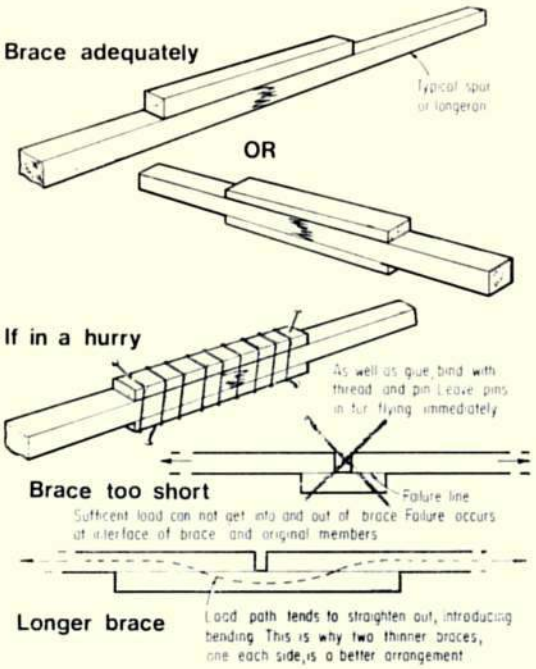
Improvisation is evident in Michael Sanderson's (of Grimsby) repair to his Coupe d'Hiver fuselage – most important to keep fuselage 'true' in this type of break.





Quick repair — Broken longeron sprung to original position, cement and pin an external brace. Cement heavyweight Modelspan covering on where necessary. No need to dope – but could have 'pseudo-geodetic' cross of cement to provide some rigidity.

typical breaks ...and remedies



The 'old faithful' balsa cement is very far from dead, however. It has properties not possessed by the rather more exotic alternatives already mentioned. It is convenient, cheap, easily handled, has plenty of 'tack' and good skin-forming properties. The last two might warrant some comment. Basically, 'tack' is the ability of a glue to hold together the mating surfaces whilst it dries. Items stuck with cement can be positioned and left. This does not apply when using epoxies and the like, which exert no restraining effect until they start to set or harden. Tack is unrelated to 'stickiness' or 'messiness' in use!

The ability of cement to form a skin is more than useful when employed as a quick way to repair splits in tissue covering. Minor covering damage can be patched simply by manoeuvring the torn edges together, and applying cement to 'bridge the gap'. The usual contractions of the cement, due to evaporation of solvents as it dries, helps draw the tissue edges together.

More extensive tissue damage demands some sort of re-covering. If time permits, this can be effected in the manner used at home complete with one or more coats of dope. This can be a lengthy process as dope is reluctant to dry in the cold damp conditions often encountered at contests. When speed is essential, heavyweight 'Modelspan' stuck on with cement, and left undoped will form an effective patch on a lightweight 'Modelspan' (or Jap) covered component.

Many repairs are really a test of initiative and inventiveness in coping with a particular situation. A comprehensive repair kit of tools, adhesives and materials, is obviously needed – but more important is the will or inclination to do the job. Broken wings, tails and fuselages can, and have been rebuilt on the tops of model boxes – and have won their events that day. But few people seem willing to undertake such a venture, and understandably so. Fortunately, there is a way round the situation for the contest flier.

Paradoxically, the best solution to a model in need of a major field repair is not a repair at all! Current domestic competition rules permit the use of two models per event, and F.A.I. rules allow three. The possession and use of a good 'spare' model (or models) is usually sufficient to avoid the need for most of the measures just described. Nevertheless, it is apparent that many competitors are reluctant to fly their reserve model – usually because they find it isn't good enough or not properly trimmed. The remedies for these difficulties should be self-apparent.

Sometimes even the use of spares can fail to solve the problem. I had this experience at the 1970 Nationals when I lost the reserve model after damaging the first one in a tree. The resurrection of a fuselage, from two large and many small pieces, was managed using a mixture of the techniques already described in this article. The whole process took just two hours flat from start to launch. This included a critical inspection of the repaired airframe for accuracy of line-up and some 'guestimated' packing to retain the trim.

These last stages are where many repair attempts fail. It is essential to try to repair the model so that it stays in adjustment. A bent fuselage or warped wing caused by repairing will merely lead to further repairs. Inspection and compensations if required are a very vital part of the repair operation. Of course, for this to be practical, the flier needs to *know* the initial state of his model and what warps and idiosyncrasies of line-up it possesses.

Having spent time this month on outlining how to 'botch' a quick repair job, it would seem advisable to promise in the next issue some advice on how to do the job properly, or 'how to repair the repair'.

Top, seen at the 1969 World Champs was Russia's A. Lepp with two apparently identical models – apart from the colour schemes. Below, the time scale allowed for flyoffs hardly allows for even the most minor of repairs. Hence handling damage or engine starting troubles could be disastrous. Immediate availability of the spare model is a wise precaution. Here George Fuller takes out two models to the 1969 World Championship flyoff at Weirner Neustadt. The 1971 event will have an even tighter flyoff schedule.

Field Repair Kit

Check list: *Vary to suit modelling interests.*

Adhesives: Balsa cement.
5-minute epoxy.

Dope

Thinners (can use to remove epoxies from skin)

Cheap brush (or use D/T fuse as expendable substitute)

Wood Strip, both balsa and hardwood, assorted sizes. Sheet 1/32, 1/16 useful in quantity other occasionally.

Tissue Heavyweight Modelspan
Lightweight Modelspan
Jap. tissue

Pins

'Sellotape' and masking tape

Elastic Bands

Thread, Cotton

Gauze, nylon

Solder, flux, iron and heat source

Razor blades

Modelling knife

Pliers and wire cutters

Straight edge

Scissors for cutting tissue

Clothes pegs and other clamps

Flat board (or model box top)

Engine spares (plugs, fuel tubing, needle valve, etc.)

Spare engine/D.T. timer

Soap (or cleanser, e.g. 'Swarfega') and water, to clean hands before launching rubber motors, or similar.

Few who were there will forget Dave Hipperson's fateful final round at the Trials to select the 1969 Team. A wing break on launch cost him an almost certain team place. With one model already lost O.O.S. a repair was his only hope. The wing and fuselage held out but the prop shed a blade on release!

CLUB NEWS

Croydon Club member John Blount takes time out from flying H.S. 125 jets to test his F.A.I. microfilm model with semi-picket fence wing bracing. Low launch enables him to take advantage of every inch of ceiling height available!

A SIGNIFICANT trend in modern club life is the growth of radio sports flying. For many of the people who have been attracted into our hobby by the prospect of fully controlled flight there is little taste for competitive flying, or, indeed, for venturing beyond the precincts of the club field or local local flying ground. It is, therefore, understandable that clubs dominated by such radio sports flyers should feel the governing body of the movement to be remote from their parochial needs, and prefers to go it alone, even to the extent of procuring private insurance.

Personally, I am inclined to the view that such 'go it alone' attitudes are misguided and ultimately destructive. Sports flying is all very well, but any group, without the stimulus of competition, tends to go to seed for want of any objective to achieve beyond the repetitious Sunday get-together. Furthermore, it becomes inward looking, and thus subject to much internal squabbling. In the wider scheme of things there is the future of model flying to protect, particularly radio flying, which, given a sufficient number of accidents and noise complaints, could well become the victim of the sort of reactive restriction which only a strong representative body could effectively speak out against. There is also the sensitive matter of frequency allocations. The ever-increasing demands upon the limited spectrum available for recreational activities could well make the powers that be reconsider what might or might not be a reputable, safe and worthwhile activity, which, again, is where the strong advocacy of a governing body is vital to survival.

Still on the ticklish issue of club life and its many disruptive pressures, we are pleased to learn that at least one multi-purpose club is not bedevilled by friction between the various interests, reporting, through the good offices of Mr. G. H. W. Johnson of **F.A.C.C.T.**, that all get on well together without any petty bickering. On the C/L side of things the members seem to be more in a racing than a Combat mood, with entries arrayed for F.A.I., Goodyear, B Team Race and Rat Race. This, combined with Mr. Johnson's Stunt flying, provides a sufficient programme in itself, although there are a few B ships standing by should the Combat occasion present itself. For R/C the accent is on the strong, silent type – the thermal soarer with foam cored wings. That, at least, is what Fred Catt is preparing for his new, 12 ft., span soarer. Free Flight is under the competent wing of Andy Crisp, who operates this aspect of club life on a solo basis, although his equally doughty compatriot, Albert Feathers, is a prospective member. Both these flyers are to be seen at all the noteworthy F/F events, where they are usually expected to get a well-merited place.

Even the broader categories of model flying: F/F, C/L, Radio and Scale, seem to require further division to suit the complex needs of club life today. A case in point is the forming of a new club, called the **Bickley Modelling Club**, in the Bromley, Kent, area. The first report, sent into us by Eric Hassell, Chairman and P.R.O., gives the motivation for getting the new club under way. Seemingly the existing Bromley club is a multi, restricted membership affair, and a number of local flyers who foregathered in Bunny Newman's 'Avicraft' model shop, felt the need of a club which would include the electronically less endowed Single flyer. Their efforts were all too successful, for a temporary ceiling of 60 members has already been achieved. These include several Bromley members, some of the calibre of Frank Van Den Burgh and Tony and L. S. Wigdore. A good start to the competitive side of things was a two class contest, novice and expert. Both schedules required straight and level take off, although, from observation, this would seem to be the basic manoeuvre so few radio model are able to accomplish. The usual way of achieving the airborne state is by a highly galvanised hand launch. Winner of the expert class was L. S. Wigdore, and that of the novice, Andrew George.

Our climate is capable of turning up the odd limpid day during the turbulent winter, and Rally organisers are always optimistic enough to believe that their day will be one of the lucky ones, but the odds are very much against, as the **Bath M.A.C.**, discovered on December 6th, when it held its first Rally at R.A.F. Hullavington. At 9 a.m., the wind howled and the rain swept, although by noon the weather had relented somewhat, turning off the splosh but leaving a stiff wind blowing towards the model-catching hangars. Notwithstanding all the hazards and turbulence, Andy Crisp (bibliography: see first report) flew at least three events: Open Power and Coupe D'Hiver which he won, and Chuck Glider wherein he placed second. D. Wain, who was pressing him hard in the early stages, hit the bunker-like hangars on his second flight, collecting only the pieces. S. Spencer of **South Bristol** won Open Glider and R. Cumming did likewise in Chuck. Presuming there to be no Open Rubber, the final F/F event, Vintage, was won by Wilf ('Let me help you') Manning of South Bristol, after a close battle with Bath Chairman, Norman Keat. Two C/L events were staged, Goodyear and A Rat. The field was a highly select one, including three teams from **Feltham-Hayes**, two from **Glevum** and one from the home club. Harknet/Smith of Feltham, did 8.33 in the Goodyear final to score a win over Rudd/King. The winners were flying a *Ginny* powered by a ST G15 RV, and the runners-up an Eta *Shoestring*. Harknet/Smith also entered their *Ginny* in the 'A' Rat Race to record a winning time of 9.53.2. A Goodyear model also in second place: that of Hamilton/Carson. Hard luck for Bath's Lodge/Lister team who had to retire after 160 laps in the final following a whamming second round flight in which they set a new Western Area record of 4.51.8. Late organisation of the rally left only the bush telegraph to spread the glad tidings, which it did most impressively – and with no fear of a strike. Response was such that plans are already afoot for a repeat the following December. The Bath club is proud to have as a member the 1970 Western Area Junior Champion, Tim Cobbald. A producer of beautiful C/L models, which he has flown with considerable contest success over the past season, he is well deserving of the title. Report from Tony Rudkin, P.R.O.

No doubt, if you wish to make money these days don't go in for producing aircraft engines, but try a raffle instead. Advice indicates from an item in the **Leicester M.A.C.** bulletin, wherein it is stated that much of the £26 profit made at the club social came from the raffle. A word of thanks given to the chaps who supplied the prizes for this and for the dance spot prizes (do the multi boys sit this one out?) Thought for the month: its nice to have a little flying patch of your very own. Leicester has such a thought in mind in spite of having two good rented flying grounds to its credit. The purchase of a small field for Radio and C/L gives a sense of independence and a greater margin of safety, but still very much a pipe dream.

A *Thermikschnuffler* is not, as you may think, a bit of tube for putting the D/T wick into, it is, in fact, the title of an international chuck glider postal contest organised from Germany. News of this and other prominent chuck glider matters is to be found in **North Western Area's** *The Message*. And just to show that the old chuck weapon is on the up and up, it is now officially known as a Hand Launched Glider, thus bringing it into line with American

nomenclature, where it is not the model but the bloke who throws it who is called Chuck. The new N.W.A. rules covering this class discards much of the casualness traditionally associated with what was once considered a novelty event, and to mumblings of sledgehammers and peanuts from H.L.G., I mean chuck glider exponents present, the committee voted a stringent set of regulations, most important of which is the rubber stamping of the glider with the official stamp of the day – not we hope to be used like a sledgehammer. And still in a knocking vein I come in for a rap on the knuckles for somewhat overstating the case of the flattened grass at Burtonwood, but how was I to know that the miscreants were other airfield users and not the model flyers – they just don't get time for that sort of thing! Apologies, anyway. In this issue Maurice Doyle, of Belfast, gets the F/F Power scene in perspective with a 1950 to the present day survey. Looking to the future he predicts the use of variable camber wings, higher aspect ratios and longer tail moment. In fact, the power model may well end up looking like an A/2, which is hard luck on the timekeeper.

Now happily installed on their new flying ground on the old Croydon Airport, the **Three Kings Aeromodellers** are putting the site to effective use by organising a C/L Stunt and Scale Contest to be flown there on 9th May. Details, we hope, in Contest Calendar. Should be some fancy models jostling to catch the gleaming eye. Certainly the Three Kings will be displaying a lot of glistening paintwork on many fine Scale and semi-Scale models now coming off the club production line. Take, for instance, Stan Lloyd's stunt-like, 56 in. span job. Powered by an Enya 7.5 c.c. engine, it is equipped with throttle control and already weighs 46 ounces, though not yet quite complete. There is also a new Wal Cordwell project on the way: a 48 in. span *Gloster Gladiator*. Fuselage will contain three bell cranks, there will be a working control column and rudder bar and a castoring tail wheel. Motor will be a Merco .61 with Roberts throttle control. Man for the colour, though, is Ken Gardner. His new *Nobler* is Pale Lime Green with Midnight Blue Trimmings – his models, like mine in a different sense, get a touch of the blues. A model that should show up a nice topographical profile is the *Percival Mew Gull* of Dave Morbin, described as a semi-scale stunter. Model of the month, was Pete Mason's *T28*. Pete is now building a F/F *Fieseler Storch* for a Mills .75 c.c. No mention of any penance imposed for this F/F heresy. In the *South Warder*, the magazine of the South Mitcham Residents' Association, Mr. N. J. Chapman continues his exposition of the model flying scene; giving the lay reader some insight into the mysteries of our sometimes inscrutable hobby.

Modelling experiences are very much the same all over the world, whether its helplessly watching a full blown spiral on a perfectly trimmed model, or trying to get service in the shop that sells model stuff as a sideline. The story in *Windsock*, the **All West Coast M.A. News** (Australia), is of a tall, handsome modeller going into a large Perth store and asking, *'Have you any razor planes?'* Whereupon the Fair Maid behind the counter replied sweetly, *'No, but we have aeroplanes'*. (Which in 'Strine' sounds logical!) Another tall, handsome modeller in the same store was directed to the Electrical Department, when enquiring after D/T fuse. Yet another story from the same magazine, this time of a slope soarer from the **Boomerangs M.A.C.**, being attacked by an angry magpie. The bird got away with a choice bit of fin and rudder, but the crippled model was landed safely. Moral: birds and model flying don't mix.

There is a reference in the **New Zealand M.A.A.**, Newsletter of an instance of the Builder of the Model Rule being violated at one of the big events down under. Whilst this may well apply to someone flying a model other than his own construction there are so many ready-made bits going into models these days, such as engine pans, glass fibre rod, alloy tube fuselages, foam cored wings, etc., that the skill comes more in the assemblage and use of components than into the making of the same. Generally, though, the model machine is now very much more of a workshop project than the kitchen table pastime thing it has been for many years. Certain components, which are now considered essential to the high performing machine, are not too easy to produce without specialist knowhow and means; thus the modeller looks around for some source of supply, but whether this is detrimental or otherwise to the movement depends on your point of view.

A correspondent from Chile, who refers to the model hobby as groovy, is anxious to correspond with one of you lucky people who can buy all the balsa and bits and parts you want, without restriction. He is Carlos Bijit. A. Prat, No. 125, Quiloota, Chile, South America.

Sorry not to have included all the reports and newsletters which failed to reach us owing to the postal strike, but let us hope that things are back to normal next month.

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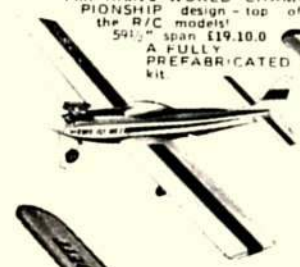

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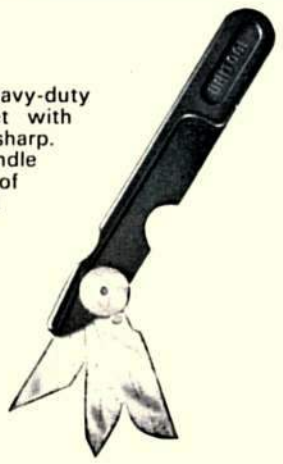

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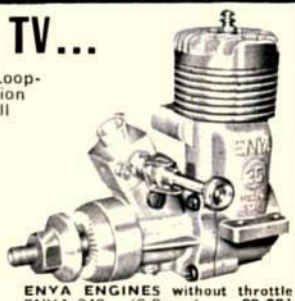

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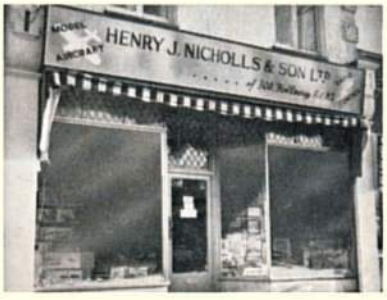

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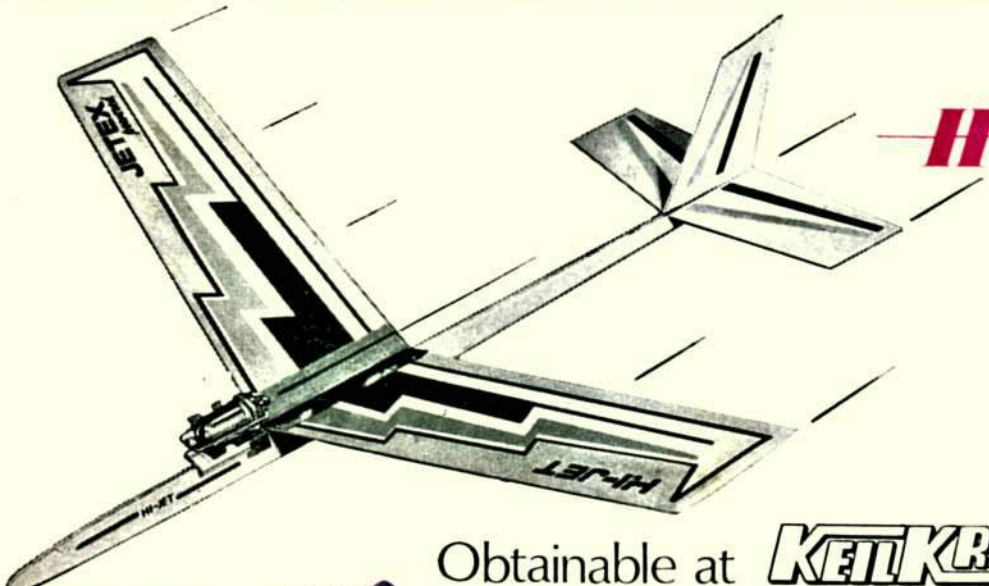

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