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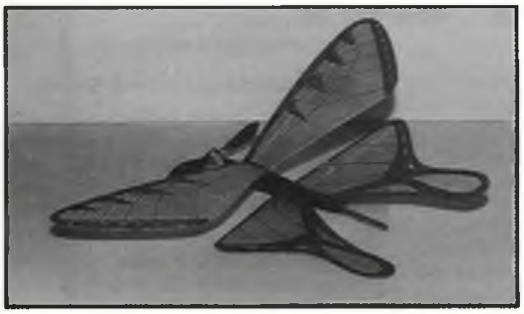

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Cover: Attractive but straightforward lines of Rob Presnell's Found Centennial Rubber Scale craft should be all the encouragement needed to build your own from full-size plans this month. Remember - simple is fun; now turn to p.266!

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HANGAR DOORS

The merry FFOXY juniors at the NZ Nats. Winner S. McDonald is fifth from right. Key element is tons of help from committed adult fliers. Full report next month.

Come to Cambrai

What are you doing on 29/30th April? If you've got a Coupe d'Hiver model doing nothing, why not spring over to the Cambrai International? FAI fliers also welcome at this embryonic 'Poitou' event. Coupe takes place on the Saturday; FAI the day after. More details, including likely hotels if you don't fancy free camping on the airfield, from Newham Beaumont on 01-393 4398. Newham also tells us that Jean-Luc Drapeau intends to bring about fifty of his young enthusiasts – see March Hangar Doors – to the Port Meadow meeting in June. Help with accommodation would go down well... contact Newham!

More on the World F/F Champs

Martin Dilly reports that a very generous donation from Bernard Aslett has considerably reduced the financial burden for our team members, who must bear most of their own travel costs, and Martin takes this opportunity to thank Bernard on the team's behalf.

Latest news of teams for Cordoba shows a few changes among the British ranks; Roger Baggott replaces Birmingham clubmate Peter Watson flying F1C; John Carter is unable to take up his glider team place and may be replaced by Bill Colledge, while Ivan Taylor replaces Dave Hipperson flying Wakefield. Among the teams already picked from overseas, the West German F1A flyers will be Aringer, Nuttgens and Wilkening; F1B will be Hofsass, Leisner and Silz; and F1C consists of Seigdel, Stetz, and Meissnest. Flying for Spain will be Campillo, Abad and Aristides (F1A), Conejero, Font and Ferreira (F1B) with Cantos doing a solo F1C performance. The United States has a couple of new names; their F1A flyers will be Dale Elder, Matt Gewain and Jim Parker; F1B will be Walt Ghio, Jim Quinn and Jack Brown; while the F1C group are Ken Phair, Doug Galbreath and Randy Archer. The home team from Argentina are Martinelli, Dondero and Palmieri flying F1A; Donelli, Clemenceau and Marquez (F1B) and Zito, Bonetto and Banos (F1C). From France will come F1A flyers Braud, Delassus and Drapeau, F1B are Chenneau, Dupuis and Koppitz, with Boutillier, Iribarne and Roux flying F1C. Canada will have glider flyers Allnutt, Farkas and Mackenzie, Wakefield men Rowsell, Andrew and McGlashan, and F1C representatives Sugden, Schlachta and Condon.

Nobler news...

Stunt enthusiasts will be delighted to hear that a one-design competition for George Aldrich's famous Nobler will be held on Nats Sunday: that is, 27th August at RAF Barkston Heath. Don Burgess passes on this news; Iain Ward will be running the event which has been given space (and time) courtesy of Richard King of the BMFA C/L Tech Committee. Even better – George himself, accompanied by his wife Julie, will be attending... Rules are: any kit or plan of the Nobler 1 design. Maximum power is .35. The model must fly the AMA schedule on 63ft maximum length lines, of 0.05in minimum diameter. Full details from Iain Ward on 0383 728825.

Gotta Beta?

Our old mate Terry Rose (he of the Hangar Doors cartoons) gets a rare old number of letters as a result of his own plans service (vintage designs a speciality). He tells us that over at Port Moresby, Papua, New Guinea, Geoff Hindley is searching for a plan of the CMA Beta of early post-war years. Can you help? Let us know at *Aeromodeller* and we'll do the necessary.

Sorry, Richard...

A slip of the editorial pen brought the following response from eight-year-old Richard Hoey, whose photograph adorned Balsa Cuttings in our March issue:

'I liked the picture but my name is Richard, not Terence, I am learning to fly my Dad's R/C Just Junior and can control it from a hand launch and land it on a calm day. I like making aeroplanes and I can get the bits out of the bin in the workshop. See you at Old Warden!'

We'll get a new notebook...

Scaledates – and Spires

Next month's What's On will contain details of the following events. Brief details here to beat the press deadline! 7th May: BMFA F/F Scale event at RAF Barkston Heath. All classes of Scale including Jetex. 30th July: Oxford MFC Dreaming Spires Gala at Port Meadow. Silent Vintage, Vintage HLG, Open Tailless (not Power) and Scale (motors under 1.5cc). Contact Charlie Newman on 0867 73020. On 17th September the Walsall MAC will hold their F/F Scale Day at Essington. Geoff Spencer on 021-556 3376 has all the gen.

Welcome Wasp

It's not our policy directly to include outside advertisements in Hangar Doors, but here's an engine in such short supply, and

Continued on p.292

Emblem above left commemorates the first Criterium International de Touraine on 1-2nd July. F1D, F1D (beginners), EZB, and Micro 35 are the classes. Interested? We can supply details.... Below: The mower season approacheth – Terry Rose's view...

'Mum says – can she have the toolbox? The mower won't start...'

take note of this!

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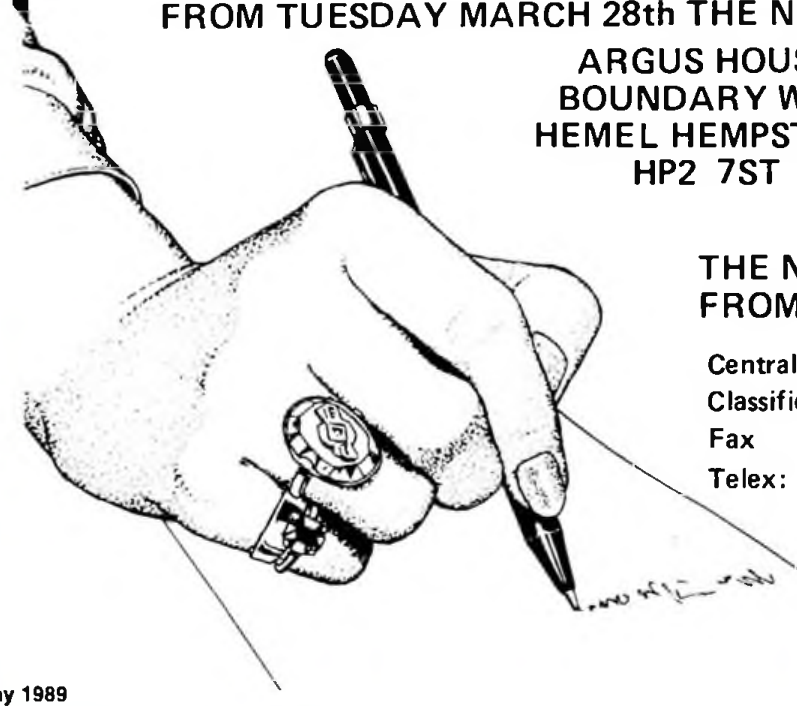

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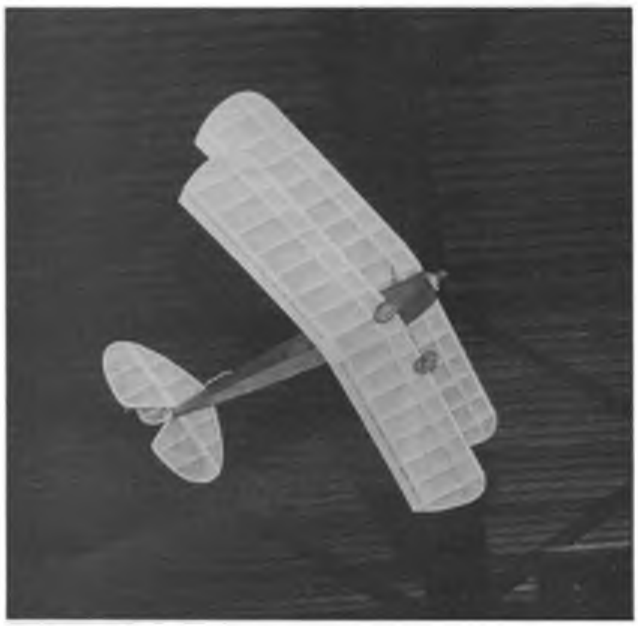


Puze

We enjoyed a lighthearted day out at SAMS Indoor Fun Fly on 5th March...

Venue: Watford Leisure Centre

THERE'S NO DOUBT that this six-monthly event, run by George Wallbridge of SAMS, fills a much-needed place in model fliers' hearts. Free from the constraints of competition Indoor aeromodelling, enthusiasts arrive for a full Sunday of fun-flying — and despite a sometimes harum-scarum level of activity, mortal damage to models is generally low. Chuckies, EZB, PND, Scale craft, and a slowly-increasing level of indoor R/C and electric F/F proves that for many the chance to fly what you want, when you want, is a high priority.

What did we enjoy most? Good to see an R/C duo of models by Peter Frostick and Robin James flying in attempted formation — until Peter's tail was bitten by Robin's prop; but the future looks brighter still for this branch of model flying. Robin's model even performed a couple of jubilant loops at the end of the day to emphasise the delights of precise control and we bet there'll be a loop soon!

Also notable was Peter Walker's efficient electric F/F layout. Two 50 mAh cells drove the twenty-five-pence Proops motor in a succession of extreme-radius circuits that had many a modeller holding his breath. Yes — electric flight can be cheap!

Foam fun

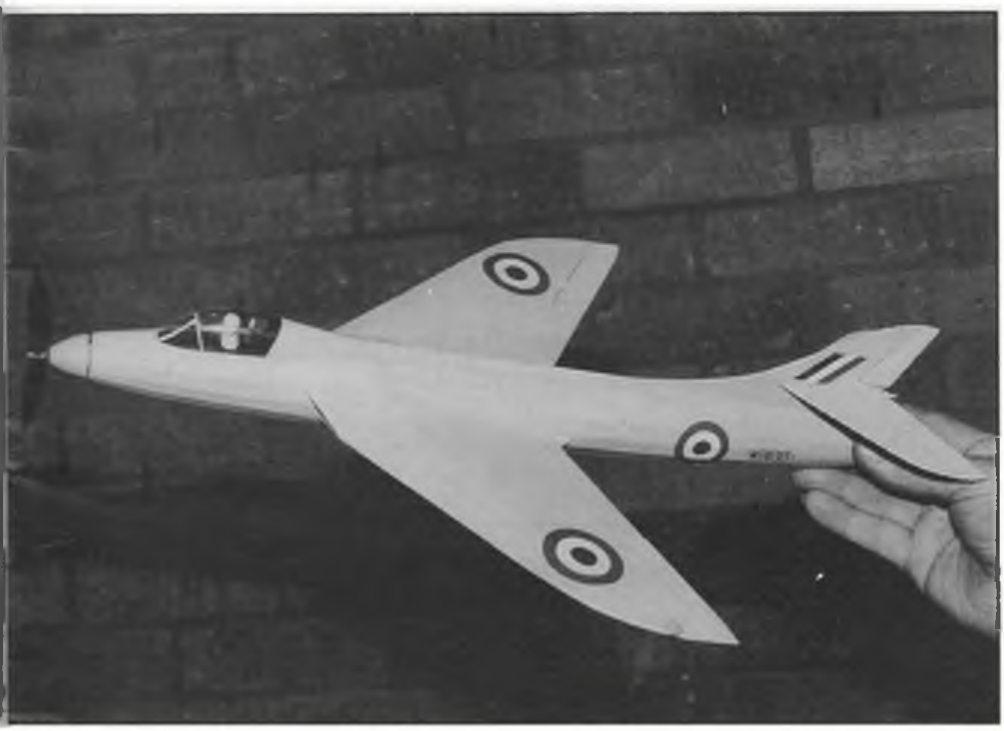
Trends? More youngsters than ever — with the boys of Chigwell School under the enthusiastic captaining of aeromodelling Sir, Tony Sizer, littering the floor with debris from George Fuller's Fun Flyer range of kits before racing to the centre of the hall in their own personal battle of flight. More all-foam models help attract the junior aeromodeller. Steven Midson's private air force points the way to light, robust subjects. As he's promised us a series we'll say no more here just yet.

A healthy clutch of R/C modellers voiced opinion that F/F really is great fun — especially for all the family. Alan Richardson and sons put down the transmitter for a Sunday afternoon and simply had a whale of a time with a foam fleet that included an Arado Ar 96 and Granger Archaeopteryx, thank you very much! And at close of the day, everyone went home well satisfied with a healthy fix of Indoor flying. Over to our photos for more flavour — see you at the next meet on 29th October?

Fun!

Opposite page, top: Now a familiar shape at Indoor meetings – Robin James' Electrolight, of semi-scale Moth layout, flies nimbly by, guided by four-channel gear. Double K&P power. Centre: Foam fun! Alan Richardson's fleet shows variety. A typical tableful at Watford. Below: Five-bob's-worth of Proops electric motor drove Peter Walker's large lightweight via shaft drive. Experimentation has paid off.

This page, top: Outdoor stuff. Clive Bunyan runs up the Mabuchis in this tasty twin. Feature promised. '89 could be the year of the electrics... Above: Walt Mooney's Sparrowhawk peanut design always flies well – this one built by Mike Stone. Above left: Steven Midson about to launch yet another of his simple foam craft. We feature them soon.... Below left: New Hawker Hunter by Derek Knight flew beautifully. Below: Youthful scrimmage amongst the bits as the Chigwell School lads get down to business.



VINTAGE CORNER

Raise the pressure – Alex Imrie looks at compressed air power

FANCY a change of Vintage scene? Or a challenge? Compressed air power could be the answer. This is what it has to offer: one hundred per cent reliability; first flick engine starts every time; no messy pollution; no noise problem and it's free! With all this going for it one might be tempted to ask why more people don't try it – well, there are certain conditions associated with this unique form of power of which some enthusiasts may not be aware. The purpose of this article is to provide a few glimpses at the historical and current states of the compressed air scene to whet your appetite. The rest is up to you!

How's it done

Air is stored in a fairly bulky container (in which it has to be pumped up). Power output is not constant but decreases as the pressure in the container reduces (rather like the power output of a rubber motor). Engines and containers are not, at present, immediately available in the UK, but their fabrication is not difficult. Indeed, it would be a piece of cake for the skilled machinists in our midst who presently undertake engine repairs or other model engineering work for us. However, if you can handle a file and a soldering iron there is no reason why you should not be able to make a simple power plant. Imagine flying your own design of model powered by an engine you have made yourself. Surely you must agree that you would get a real kick out of that – and as you will see, it would be all perfectly acceptable under the Vintage heading!

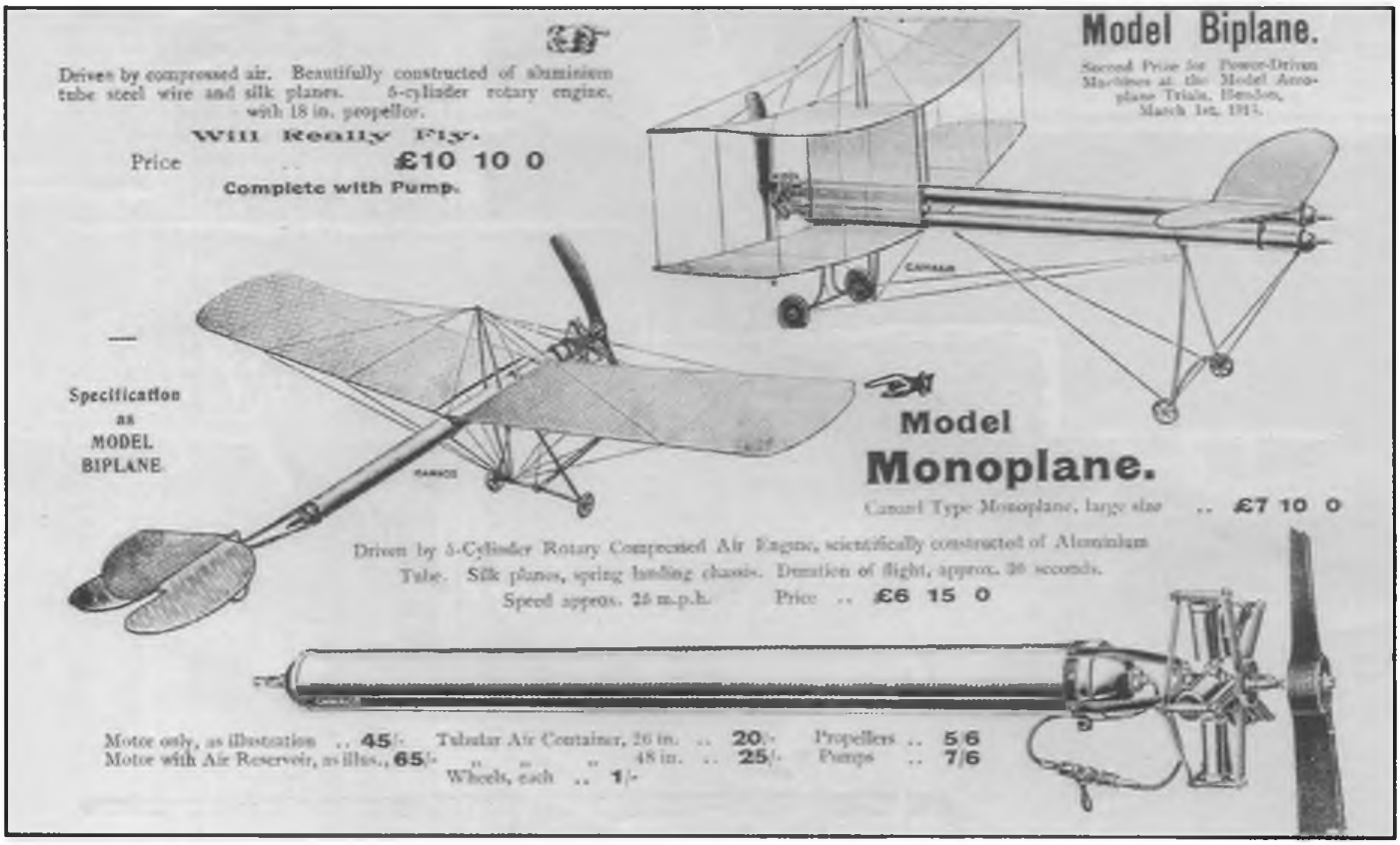
SAM and compressed air

Although interest in vintage models has blossomed into a pretty wide divide, the lead taken by the Society of Antique Modelers receives recognition. Of course, in the USA many contests for old time models are run on SAM rules. In this country we have had a few half-hearted attempts to follow suit, but generally the fly-for-fun approach wins and to the best of my knowledge none of our vintage competitive affairs have any really strict rules. The main rule of the game, authentic adherence to an old design, has tended rather to fade, and for years we have had a band of brothers who change outlines and structures to 'improve' old designs, this usually being done under the guise of modernising the design to suit the use of present day materials or for the fitting of R/C. It comes as a relief to look at a vintage class where these pretexts can be dropped and enthusiasts are given a free hand in the design and construction of their airframes.

The SAM Special Events ruling for compressed air competitions states that this variety of model can be '...any model (may be original design) powered by a compressed air motor of the 1920s type (no CO_2 engine allowed). Maximum air pressure, 150 lbs per square inch. Model must be ROG. Three best flights score.'

Now, this is something completely different to what most of us have pursued these last few years. Here the vintage emphasis is placed on the engine. Modern materials, modern design know-how and latest aerofoil sections can all be incorporated into one's own creation and used to advantage just as long as an old-style motor is employed. Thus, although the engine itself is made to an old-time principle, the air container can be constructed out of any material (plastic soft drinks bottles are in vogue) and does not have to be of 1920s type, fabricated from brass foil and wire wrapped, which constructional method must have dissuaded many would-be compressed air enthusiasts from tackling this intriguing power source. For the true vintage buffs who cannot stomach this approach, by all means go ahead and try a genuine old compressed air design with all the materials and techniques of the time; but I hazard that your flights will be brief, and like others before you, the results might not contain your interest. Now, despite the 'authenticity-at-any-price' label that I seem to have earned over the years, I think that the SAM approach is worth a whirl and the improved performance of such models might

Real vintage stuff! French compressed air items from the Gamages 1913 catalogue. Not only is the engine rotary, the cylinders oscillate as well, air being fed to the pistons via hollow connecting rods!



see a resurrection of enthusiasm for compressed air power.

In the beginning...

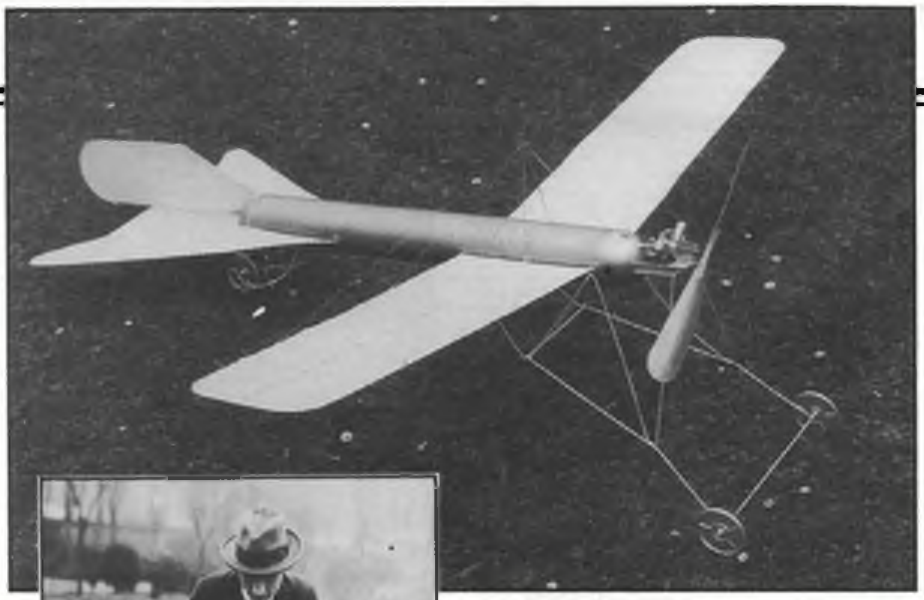
From the beginning of model aeronautics there has always been a strong interest in powering flying models with mechanical means, and in the period up to the outbreak of WWI, clockwork, steam, petrol, carbonic gas (CO_2) and compressed air had all been used. The first practical commercial compressed air plants for this purpose were of French manufacture, and nearly all of the model-making firms at the 1912 Paris Aero Show had such units for sale. The engines of these plants were usually multi-cylindered, radial or rotary, some of them fitted with reduction gearing. One engine was claimed to have powered a model that flew for 175 metres (578 feet).

Gamages of Holborn were quick off the mark. In time for Christmas of that year they offered an imported, ready-to-fly canard monoplane fitted with such a power plant, complete with stirrup air pump suitable for inflating the container for £6.15s. 0d. (£6.75). This French product incorporated much aluminium tube in its construction, even the long cylindrical air container being of this material. Early in 1913, at the Aero Show at Olympia, two compressed air models were shown by L'Essor Francais, the only foreign club represented. One of these was a twin air container canard biplane. Later at the flying trials at Hendon, this machine placed second with a flight time of 35 seconds (ROG), and this design too was soon available from Gamages at a price of ten guineas (£10.50).

One of the earliest German compressed air units was known as the Vici. The brainchild of Fritz Saran of Berlin, this plan introduced the brass foil, wire-wrapped air container with hemispherical brass end pieces, a style that was extensively copied to become the universal type of air container for model aero use. When produced by Bing Brothers of Nuremburg, one of the largest manufacturers in the German toy industry, it was known as the Autoplan. This power plant weighed fourteen ounces (engine 3.1/2 ounces, container 10.1/2 ounces) and was naturally also sold by Gamages. Enterprising modellers now began to make their own compressed air power plants but WWI stifled any real development until the early 1920s when several modellers devoted themselves to the problem with varying degrees of success.

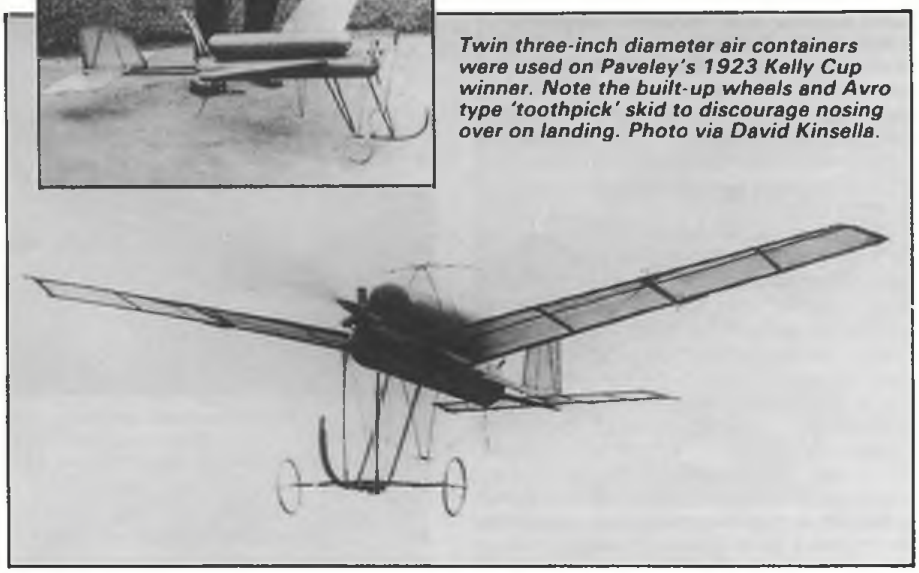
D A Pavely

Our foremost exponent of compressed air was undoubtedly Douglas Alexander Pavely, who made his first engine in 1914. Having established his own model business he produced a whole range of ready-to-fly models and exact scale models of full size aircraft. He also specialised in making beautiful hand-carved propellers of every description. In the early 1920s Pavely made compressed air engines and containers, and produced complete, ready-to-fly compressed air designs of biplane and monoplane configuration that were initially sold solely through Gamages, but were later available from his shop at 187 Replingham Road, Wimbledon. He won the Felix Kelly Challenge Cup for compressed air models in the three years that this competition was held (1922 to 1925). Flying an eight-foot span monoplane, his times on 30th September 1922 were 59, 70 and 68.6 seconds (ROG), all of which broke David Stanger's 1914 petrol driven record. The highest time was accepted by the SMAE as the British non-fuselage compressed air record, being also recognised as the world's compressed air record. His times at the 1925 competition, when he won the Cup outright, were 55, 55.4 and 60 seconds, reported as '...three spectacular and high flights'. He also held the Sir John Shelley Cup for power driven models for several years from 1926, and since the Wakefield rules then allowed it, he even entered that international competition, taking second place in 1929 with a 7ft 6in monoplane weighing 1.3/4 pounds. On this occasion his times were 58.8, 67.6 and 59 seconds respectively; his best time was only 2.8 seconds less than that year's Wakefield winner, R N Bullock. This flight was recognised by the SMAE as the British Fuselage ROG compressed air record. These two records were never bettered, but were eventually dropped from the list of British records because of lack of contenders. The appearance of petrol-engined models in the early 1930s rather ousted interest in compressed air as a power source for model aircraft, and even D A Pavely devoted himself to other things. He was very much a 'doer', but when he could be persuaded to write about his modelling experiences, the results were enthralling narratives full of technical information. His two *Aeromodeller* articles (September and December 1947) are worth careful study by anyone interested in compressed air. He ended the latter by stating that he was '...picking up the threads again' after a break of eighteen years, and hinted that at least one compressed air model might appear the following season. Indeed it did, and D A Pavely showed his mettle in the 1948 Bowden Contest. His model '...looked a bit ancient with its undercarriage skid between the wheels...' but its stability in flight was favourably commented upon. This was possibly his final model, and so he left the scene still the holder of the British compressed air records already mentioned. Both of these are now over sixty years old. If at



Above: the German Bing Autoplan monoplane of 1914 was also sold by Gamages. Price, ready to fly and complete with suitable air pump, was twelve guineas (£12.60p).

Left: D.A. Pavely at his high-pressure stirrup-type air pump (20in stroke, 1.1/16 inch bore) with which he could put 250 psi into a container. Photo via David Kinsella.



Twin three-inch diameter air containers were used on Paveley's 1923 Kelly Cup winner. Note the built-up wheels and Avro type 'toothpick' skid to discourage nosing over on landing. Photo via David Kinsella.

the present time an active interest in compressed air can be created, one is bound to ask whether we ought to do something about improving them. DAP would certainly have approved.

Recent activity

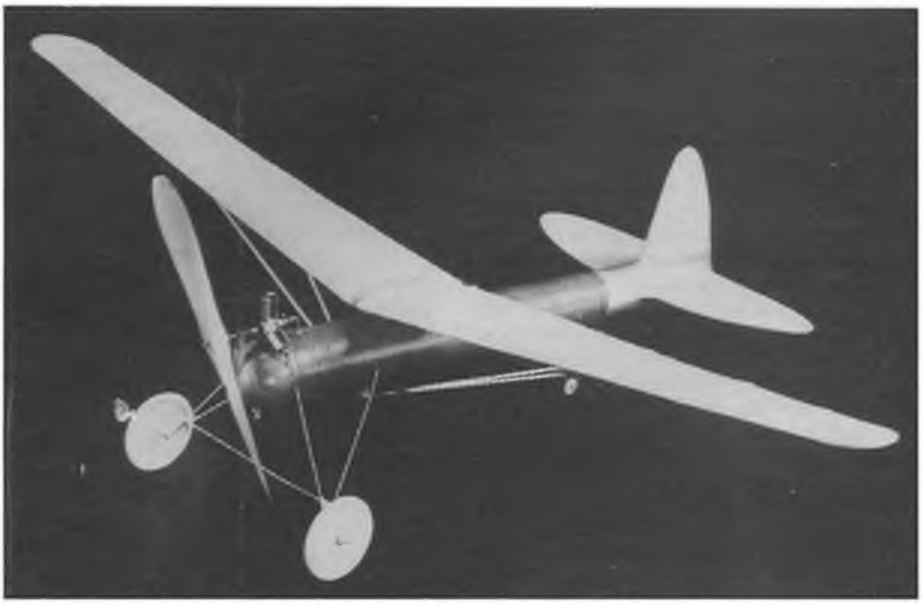
My plea in last November's *Aeromodeller*, where I recounted a conversation with Tony Turner at Vintage Weekend about his compressed air model, and asked that anyone interested should contact me, obviously fell on deaf ears since there were no takers! I also mentioned that Peter Martin had put up a trophy for such models some years ago but this had not exactly resulted in a rush of competitors. As far as I know only Tony himself and Jack Humphreys completed flying models. Jack has kindly related his experiences and it is upon this first-hand account that I now draw.

Loss of flying space through noise caused Jack to try CO_2 models, but then he saw a compressed air engine that Peter Martin had made and learned that Peter had collected much information on the subject, including descriptive articles on construction. Peter can still provide this packet of information (see later) and Jack, having obtained this material, started to make various engines.

Over to Jack:

'The first one was built out of scrap pieces of half inch diameter copper tube and odd bits of aluminium. It did not look very elegant but it worked, and ran quite well. A more authentic motor was now made, an Ott Featherweight which was a rather spindly half-inch bore motor. This ran really well, so Ott's more compact, 3/8in bore engine was built, which ran even better. I then made designs by Westbury, Camm and Pachasa. All except the Pachasa, a flat twin, were three-cylinder engines. In all cases I found difficulty in obtaining published information on propeller sizes. A more pressing problem was the air container. Aluminium beer cans epoxied together were not satisfactory, so the old style of container was tried. Three thou. brass shim foil was wound diagonally onto a thick cardboard tube and soldered along the seams. It proved impossible to get the completed shell off the tube, so the whole thing was soaked in a bath of water until the cardboard could be poked out as a soft mush. End caps were from old water cistern ball-cocks (contrary to the widely held belief, friendly plumbers can still find examples of these old items today). A length of 18 swg piano wire was stretched between the caps, then the outside of the tank was spirally wound with 24 swg piano wire soldered to the foil at regular intervals. Suitable connections came from car inner tube valve assemblies and a pipe was soldered on for the air supply to the engine. The most suitable shut-off valve that I found was an 'on/off' cock from an old steam engine. This tank was progressively tested with various motors up to 150 psi and tests made with a variety of wooden propellers. The tank was heavy and bulky so another container was made, again on a cardboard tube mandrel; but this time, before applying the brass foil, the tube was wrapped over its full length with firm string. Thus after soldering, the string was pulled off and the tube fell easily free.'

Above: A three-cylinder Pavely engine and miniature container were used by James Pelly-Fry in his sleek 1931 racer (wing loading was fourteen ounces per square foot!) which was designed to attack the SMAE speed record of 32 mph, over 100 yards, then held by R.N. Bullock.



Above: R.J. Trevithick took second place in the 1933 Sir John Shelley competition with this 46in, 10.1/2 oz machine. The engine, of 5/16 in bore and 3/8 in stroke, had a ball-bearing crankshaft; running on 150 psi it produced 2200 rpm at the twelve-inch propeller.

Jack built Joe Ott's monoplane design, enlarging the span to eight feet, but the balsa construction was pretty flimsy and attempts at flight were restricted to calm conditions. However, a major problem arose when he found that he could only get about 50 psi into the tank with a normal foot pump. The 150 psi tests had been done on his workshop premises. He also found that the motor was frequently knocked out of alignment when the prop touched the ground during landings. To try to alleviate this he made a folding propeller, but because of the 'low pressure' flights, landings were still made with the propeller rotating, and damage continued to occur. The first requirement was more pressure to get the model high enough to exhaust the air, thus stopping the propeller and allowing it to fold, and a good glide to ensue. In the field a small petrol driven air

D.A. Pavely returned to his old love after an eighteen-year break when he flew this compressed air model against diesel and petrol powered machines in the 1948 Bowden Contest at Fairlop. Although he failed to place, his performance received favourable comment.

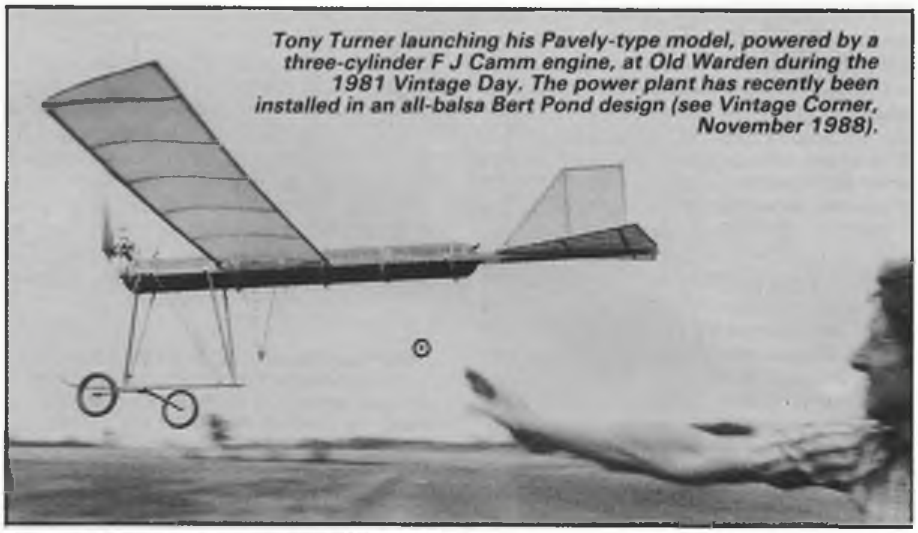
compressor would provide the answer. Some years ago Alwyn Greenhalgh used such a device when demonstrating one of his compressed air models at Old Warden. It was while in this quandary that Jack found, quite by chance, that some local boys were making water rockets and were pumping up plastic lemonade bottles to about 50 psi, so he decided to do a destruction test to see at what pressure they failed; and, more importantly, whether the failure might be dangerous. Jack relates: 'I was amazed to find that all the bottles that I tested (these were of various makes and types used by the popular soft drinks manufacturers) pressurised safely to 150 psi using a workshop compressor whose relief valve operated at that pressure. Even with rough handling they never failed. This convinced me that they were safer than brass foil, wire-wrapped tanks, since the plastic bottles had a natural resilient property and were not prone to corrosion or chemical action in soldered joints; and I felt too that they were obviously more crashproof.'

More of Jack's experiences will appear in a follow-up article; this will include his method of joining the plastic bottles together to create a larger container. Readers who want more immediate information are advised to contact Peter Martin at 16 Ashfield Court, Middleton Hall Road, Kings Norton, Birmingham, B30 1AF with an SAE asking for his twelve-article list on compressed air engines, containers and models, which can be supplied individually at nominal prices; or send £6.50 for the set. Readers' attention is also directed to the review of Bert Pond's current book. With all this information on what has generally been a neglected subject, we hope to see an increase in compressed air activity at Vintage Weekend at Old Warden this year... remember the dates, 19-20th August.. plenty of time to make a model, container and engine. C'mon, have a go! I will personally help you pump it up!

Expansion Engine Powered Model Aircraft

by Bert Pond. Limited edition, available direct from 128 Warren Terrace, Longmeadow, MA 01106, USA. Price £13 surface mail, £15 insured post. Send your own address lable when ordering. Delivery is immediate.

If this Vintage Corner has stirred your interest, Bert's book is a must for you. The only known book on the subject, it is an authoritative work that all model aeroplane (especially vintage) enthusiasts should have in their library. Bert has been active with compressed air since Lindbergh flew from New York to Paris in 1927 and has probably forgotten more about the subject than the rest of us will ever know! He has amassed a truly fantastic collection of information within the soft covers of this 180 page compendium. Here is a brief synopsis: articles about Ott, McEntee, Hargrave, Langley, Pavely, and more besides, all profusely illustrated with over 200 plans, photos and sketches. The pages are specially bound so that plans lay flat when the book is opened. A bonus is seventeen pages of folded plans and photos loose inside the rear cover. Brass foil, aluminium beer can and plastic beverage air containers are detailed



Tony Turner launching his Pavely-type model, powered by a three-cylinder F J Camm engine, at Old Warden during the 1981 Vintage Day. The power plant has recently been installed in an all-balsa Bert Pond design (see Vintage Corner, November 1988).

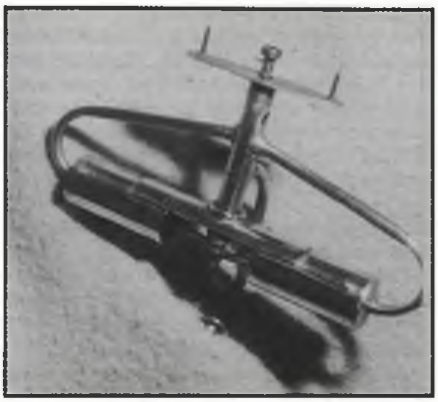
Above: Jack Humphreys showed a Joe Ott compressed air monoplane – modified to take three coupled Tizer plastic bottles – at Shefford in October 1982 when SAM 35 held their first National Exhibition. Note use of a folding propeller, for reasons mentioned in text.

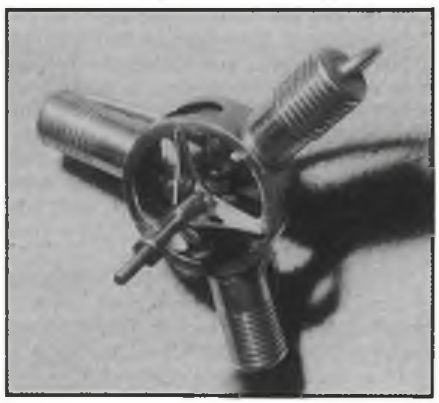
with full instructions; seventeen different compressed air engine plans are given, many of which are easy to make. Over two dozen compressed air driven models are described, some being record holders or contest winners. There are specifications of 38 different CO_2 engines, thanks to the help of prominent collectors; three steam engines are shown with plans for building two steam driven models. The rules for compressed air events at SAM and US National level are given plus tabulated results of the last 13 years of compressed air competition... there is even mention of a full-size man carrying machine powered by compressed air!

Although this publication contains lots of historical information, it is also very much a 'how-to' book which simply oozes practical hints for the compressed air modeller.

Build light and keep a record of how you

Below: Jack Humphreys built this simple 1/2in bore flat twin compressed air engine designed by Ed Pachasa, who later changed his surname to Packard and is better known for his Cleveland Model & Supply Company.





This three-cylinder F J Camm engine, described in various early publications, was made by Jack Humphreys. An identical was used by Tony Turner in the model at top of page.

did it, advises Bert. Meniscus doping, foam-core wheels, ribs doped to the tissue covering with added monofilament for spanwise bracing; all dodges to keep the weight down. It is not just a case of selecting lightweight balsa; successful compressed air modellers have developed an 'indoor' building technique that is strong enough for outdoors. This is a discipline that needs eternal vigilance. The

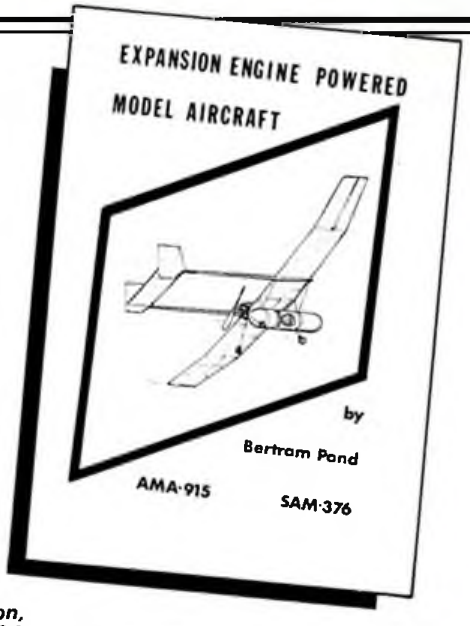
models described in the book are true performers. Two things they have in common are light weight and sizeable wing area – we are speaking of 60in models weighing as little as twelve ounces. When one remembers that the Hoosier Whirlwind, fitted with a 24 x 3 in brass wire-wrapped container weighs some eight ounces, it can be seen that there is not a lot of weight left for the structure.

Methods of testing thrust produced by various engine/propeller combinations are given, and the resulting data can be rapidly evaluated to determine how a projected model might fly. Compressed air, having an energy output similar to rubber, means that propeller design is based on the same principles as efficient rubber propellers, employing quite coarse geometric pitches: a fourteen-inch propeller for use with the normal three-cylinder type of engine requires a pitch of twenty-one inches. Engines employing every type of valve gear have been tried, but the enemies of weight and friction decreed that the propeller shaft operated valve is the best bet; Bert provides two pages of descriptions and drawings that absolutely rivets one's attention. How about lubrication? Some engines feature balanced pressure systems: most do not, and a few drops of oil injected into the engines suffice; but many engines are efficiently lubricated by... air alone! Bert has looked at the possibility of using gases other than air, and, although the data presented is possibly academic, heating the air and thus expanding it between container and engine has been tried. as well as the use of simple, nitrate soaked cardboard for this purpose, details of more sophisticated heat exchangers are given.

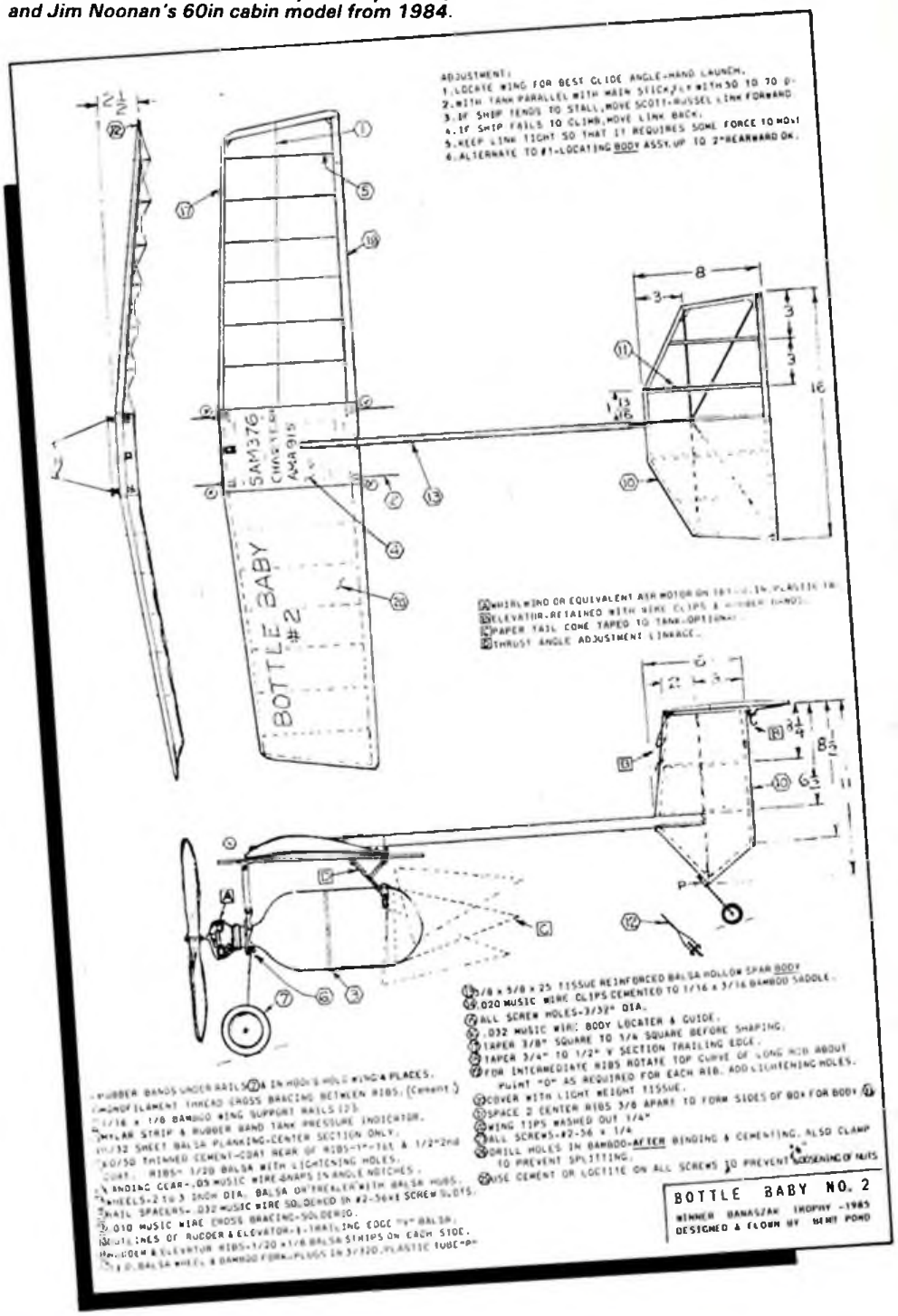
From a study of the various engines described, it would appear that the compact Ott and Whirlwind three-cylinder types would be the best for present day use. Bert highlights a number of errors in the detail drawing of the Ott engine parts, but states that if these are rectified the engine should be satisfactory. Bert himself still produces Whirlwind engines and containers to order. The secret of making engines easily is to obtain excellently-fitting materials before any machining is done, so fishing rod ferrules are a first selection for pistons and cylinders; but most model shops stock telescopic brass tube, notably K&S as specified by Bert, who even tells how to make cylinders from discarded Ni-cad battery cases!

The instructions given for the construction of aluminium beer can and brass foil wire wrapped air containers are detailed to the *nth* degree. Bert does not leave anything to chance. He recommends that plastic bottles should be selected with care, noting especially that no thin places exist on the cylindrical portions. The label and base glues are easily dissolved with acetone without damaging the bottle plastic. Other compressed air enthusiasts besides Bert overcome the 50 psi limit of foot operated tyre pumps and hoses by using a 12 volt air pump driven from a car battery (usually from the cigarette lighter socket). The advice is that the most suitable style has a short hose and a long electric cord with a switch near the pump; it is fitted with a dial-type pressure gauge.

It was Jack Humphreys who introduced the plastic soft drinks bottle as an air container, but Bert has devised an intriguing pressure gauge for this system. Knowing that the bottle expands under pressure, he wraps a thin, circumferential band of Mylar snugly around the bottle tensioned by a rubber band. By means of a checking mark on the overlap he found that the three-litre bottle expanded about 1/16in. for each 30 psi increase. At 90 psi the marks on the overlapping band showed that the bottle had stretched by 3/16in, but it returned to its original size when the pressure was released. Another



Drawings reproduced from Bert Pond's book Expansion Engine Powered Model Aircraft are of the author's 42in Bottle Baby No 2 which first used the 'plastic bottle' air container successfully in competition, and Jim Noonan's 60in cabin model from 1984.

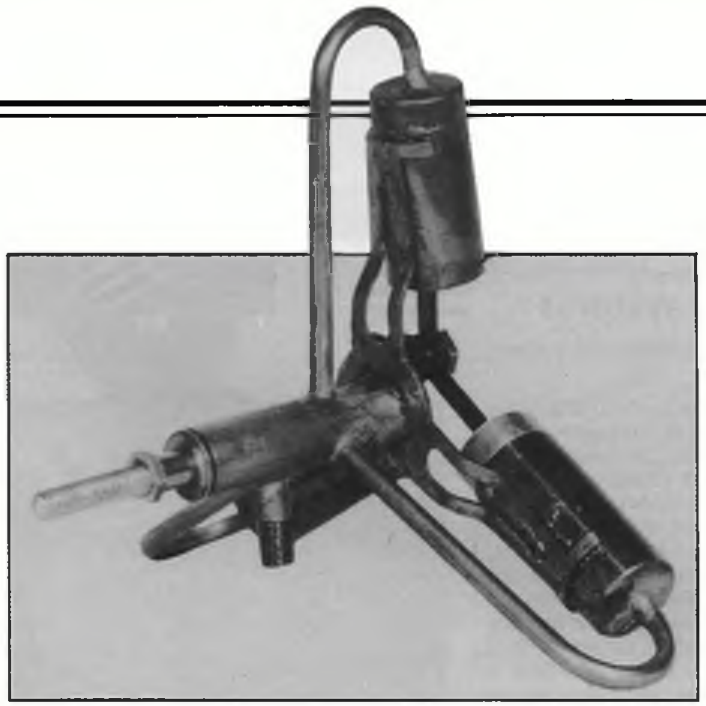


important piece of information can be deduced from this simple gauge: when the bottle does not return exactly to its original size when unpressurised, the tank has exceeded its elastic limit. Useful life is over and it should be replaced. Bert found that plastic bottle air containers were fifty per cent lighter than the brass foil wire wrapped variety. He built his appropriately named Bottle Babies with this information and won the Banaszak Trophy in 1985 with his 8.41 ounce Bottle Baby No 2, thanks to a fine ROG flight.

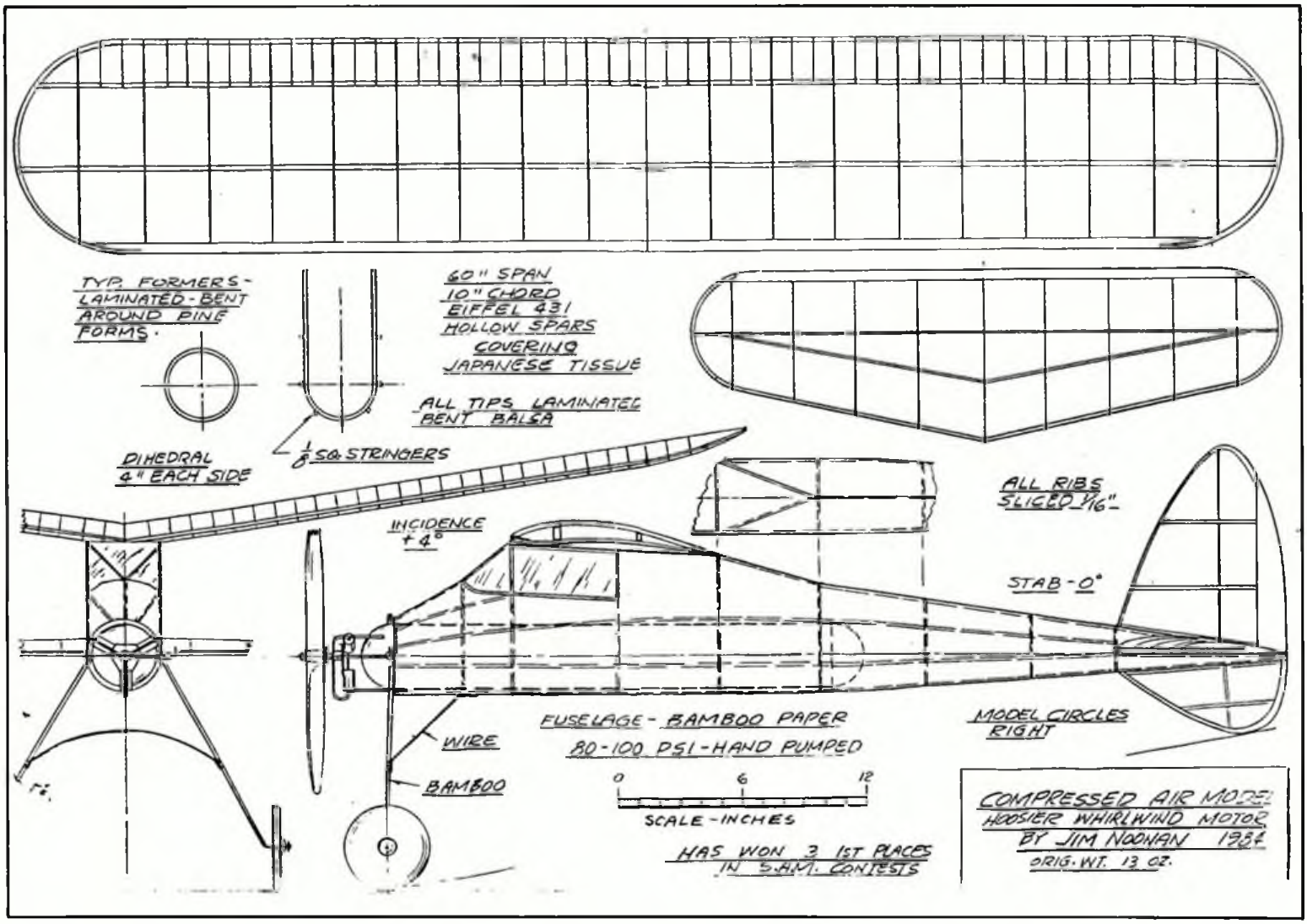
Through this book I learned that Pavely's world record of seventy seconds was broken by Hughes Hobart on 3rd September 1932 with an ROG flight of 146.8 seconds. A hand-launched flight later on the same day clocked 212.2 seconds. Bert includes a plan of the Hobart Model which is a SAM favourite today, as is the King Burd and Karl Speilmaker's Drone. The times clocked up by these machines under ideal conditions can be around three minutes - compressed air models have flown away OOS and been lost - so Bert advises that the hot designs should have dethermalizers fitted - or R/C! Yes - there is even a description of one of these.

A fascinating book that I just could not put down - but don't take my word for it - listen to this. So engrossed was Mike Beach in this 'absolutely superb' book that he complained to Bert that it was causing him to neglect his business activities! Jack Humphreys, who has been resting from an attack on compressed air several years ago, has again been galvanised into action after reading the book; he is already wielding brass tube and soldering iron, and threatens to build a Bottle Baby!

Compressed air is an infectious affair. Even though you may never have contemplated this mode of power, you will almost certainly become a compressed air addict, once you read this book since no-one can fail to be influenced by the enthusiasm that pervades its pages. This pure magic has held Bert Pond's interest for over 60 years. Now he gives us the benefit of his long experience in this wonderful publications. Take my tip, get one while it's still available. You won't regret it!



The Sky Flyer 3C motor was marketed by Joe Ott in the early 1930s, both complete and as a kit of parts. A similar engine produced by Bert Pond at the same time known as the Hoosier Whirlwind is still available - and has been used with success by many SAM members.



Link up with Chris Bradford's gen on C/L throttle systems

FIGHT

THE TROUBLE with explaining about learning anything is that you assume that everyone learns in the same way as yourself. Not so. A club youngster who had just lost his silencer asked how he could make it more secure. I told him that I always used Loctite on the securing bolts, for they would then never work loose. Result? An engine that simply wouldn't run, for the bore was full of the adhesive. I had assumed that he knew he should use it sparingly. The point of this? Don't be surprised that I have gone back to basics for this article. At least I have learned that's important!

Throttle up

What's needed to make a trouble-free throttle system for multi-engines?
Reliability is always my first priority. I hate having to dig deep into a model to get something to work after failure - and to repeat effort is tedious. Not to mention the frustration when something fails at a crucial moment. **Simplicity** means less to go wrong. Gremlins do not like simplicity. Also, a simple mechanism is easy to make.

Now is the time to examine my set-up shown in Fig. 1. While you are looking at it, compare with another, conventional layout as shown in Fig. 2. My system is simpler; it employs fewer changes in linkage direction, very few parts, requires hardly any maintenance and needs little effort to drive it. In other words, there is little friction in the system. A happy by-product is that it takes up less space than most other systems, and it is light and cheap. In a word – it's ideal for control-line (don't tell anyone I also use it for R/C!).

The fit-up

Decide where in the wing the system is to fit, taking dihedral into account if necessary (see fig. 3.). Take a piece of 1/16in welding rod, long enough to pass between the outside edges of both nacelles. Clean thoroughly with wet-and-dry paper – and remember, silver solder the linkage. Soft solder just won't last. Cut out wing ribs with holes well over size. See Fig. 4. If you are installing the system with the wing half built, hack away at the holes until there is just enough rib left to maintain the section with strength. Torque rod levers are next. See Fig. 5. Make these from 18 swg brass or steel. At a pinch, doubled-over tinplate will suffice. I use 1/8 in sheet paxolin for bearings. An old tray from your children's school is ideal, but circuit board, or indeed any plastic that may be glued, is quite suitable. Don't choose wood; if it gets damp it will shrink and may well jam everything up. Clearance holes are just larger than the welding rod linkage. See Fig. 6. Dry assemble the system, making sure that the torque rod levers are in line with the bellcrank system and throttle arms. Test fit the engines and bellcranks, using ball joints and quick-links where appropriate for

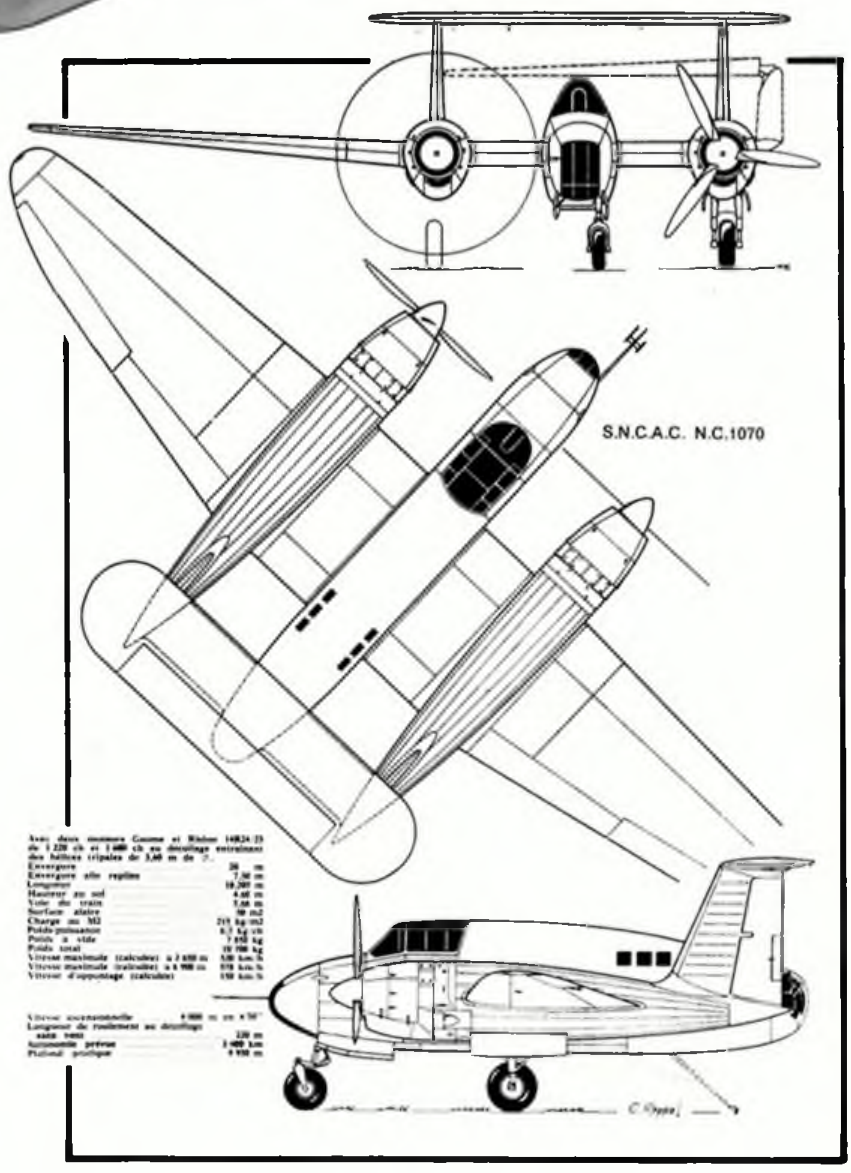
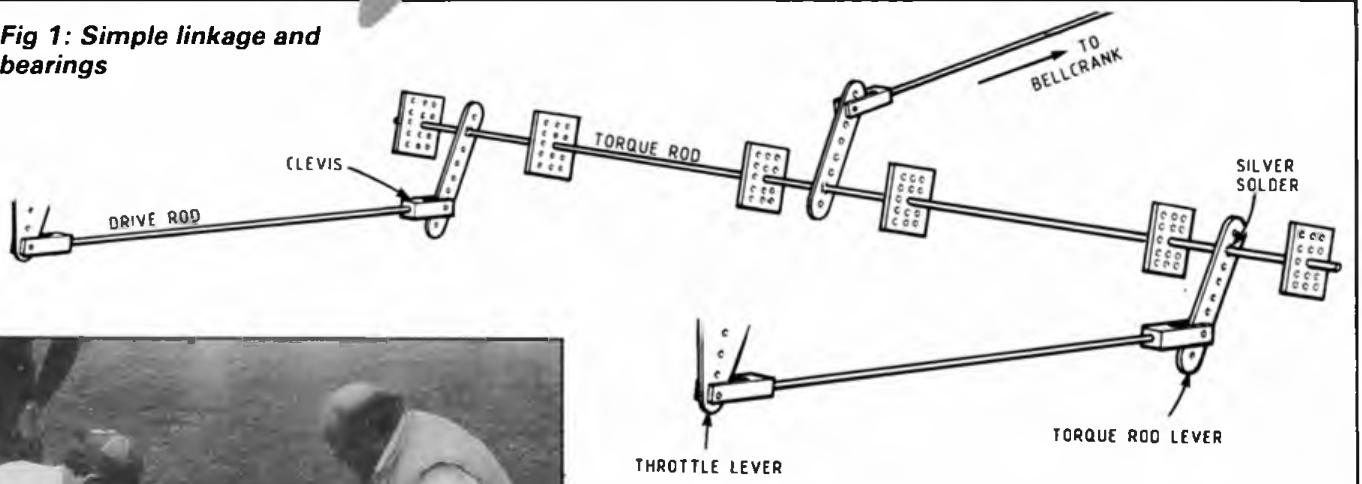


Fig 1: Simple linkage and bearings



Heading: Chris – in famous helmet – with his well-known Dakota which incorporates lessons explained here. Left: Why not build this? Quirky French NC 1070 dates from the 50s. Drawing from La Fana magazine. Above: Noted 'twin' enthusiast Wal Cordwell tweaks the throttle line as Geoff Burkett spins up the Blenheim's starboard motor.

simplicity. Refer back to Fig. 1 again. Mark where the torque rod levers will be silver soldered. Remove, and re-assemble on the bench with bearings in place. Solder everything as required, and offer up to the wing again at full-throttle setting. Glue the bearings in place, starting at the nacelle end and working inwards. Run cyano around the edges of each bearing strip – nothing is faster-acting, and everything stays in place.

Try it!

Moving the bellcrank between open and close throttle positions will enable you to check for satisfactory functioning. If the motor throttles fail to open or close simultaneously, don't panic. The reasons may be as follows.

(a)

Pushrods from throttle to torque levers are of unequal length, or the engines may not be mounted identically. Adjust the clevises to suit.

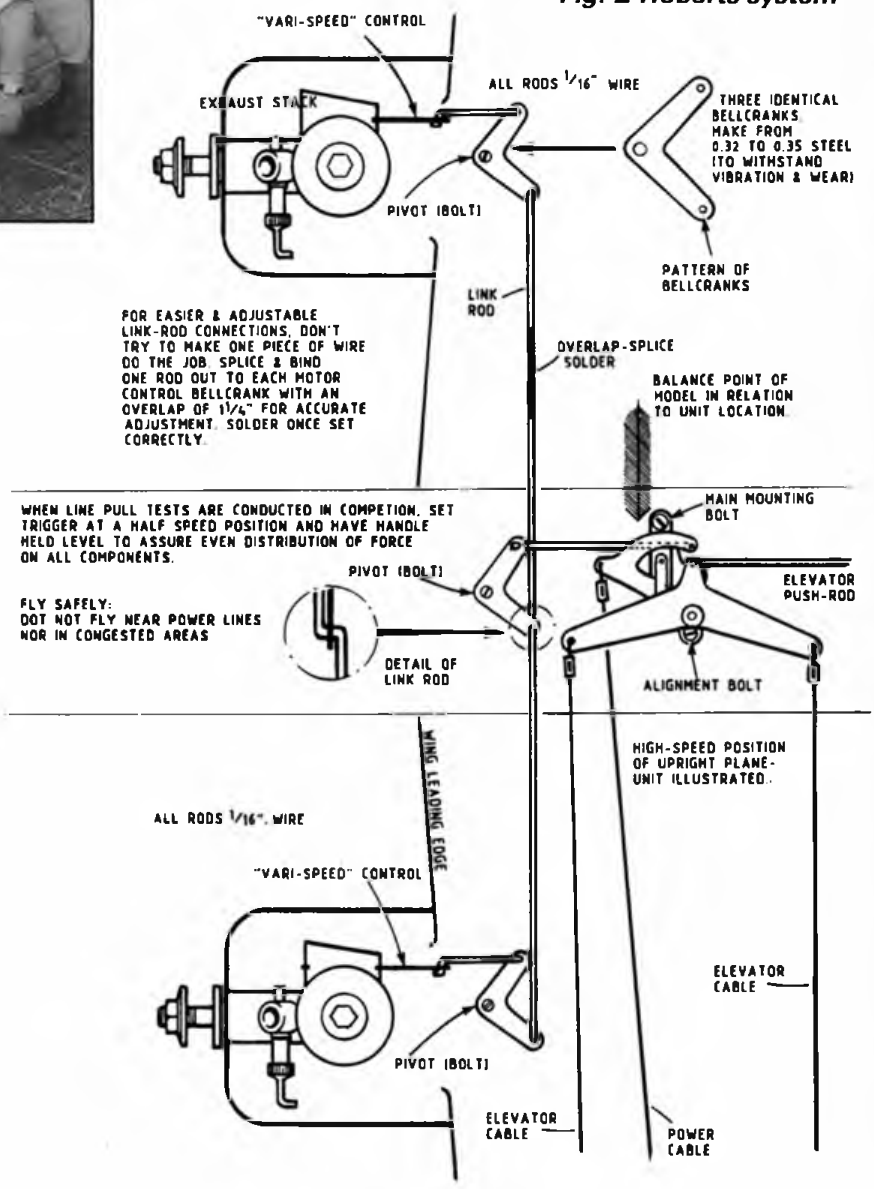
(b)

Pushrods may not be in exactly identical bellcrank or throttle holes. Remedy accordingly.

(c)

Torque levers are not in exact alignment.

Fig. 2 Roberts system



Sighting down the wing will reveal any relative twist. Tweaking the linkage will put this right. Fig. 7.

Restriction of linkage movement - that is, if there is insufficient movement between limits - can be remedied by up-or-down adjustment of the central torque lever. Any adjustment to outer torque rods or throttle arms must be identical at each nacelle.

And lastly...

Don't forget the vaseline - an ideal lubricant for the bearings. A final 'twin' tip: align engine cylinders upright, inverted or at 45 degrees - never horizontally across the airframe. Everything will vibrate to bits if you do...

Fig. 3: Allowing for dihedral

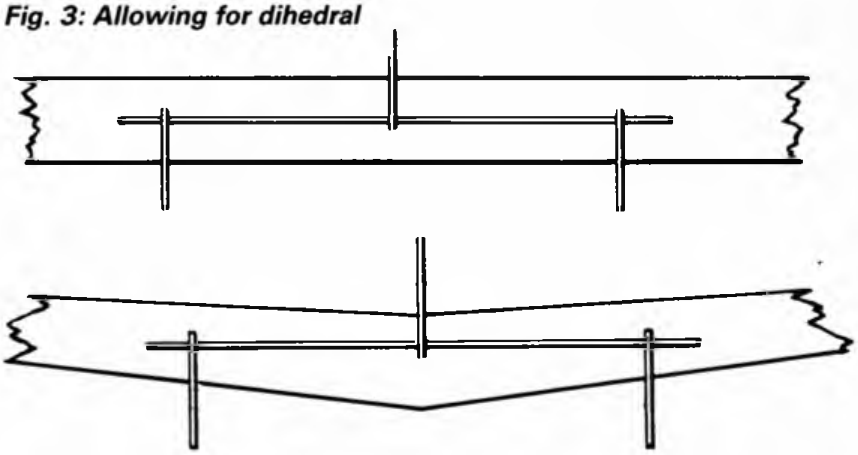
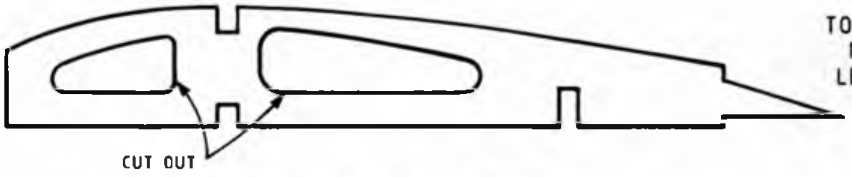


Fig. 4: Plenty of room for linkage



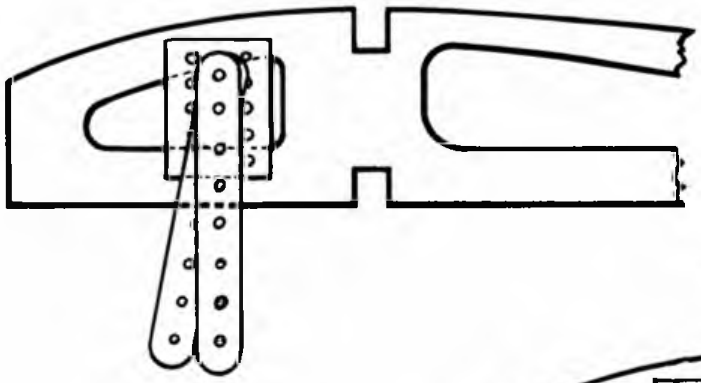


Fig. 7: Line up by twisting

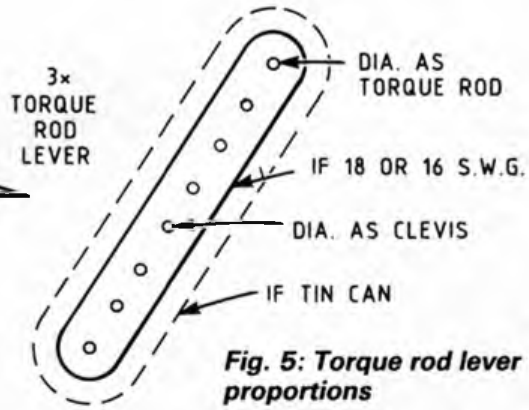


Fig. 5: Torque rod lever proportions

Fig. 7

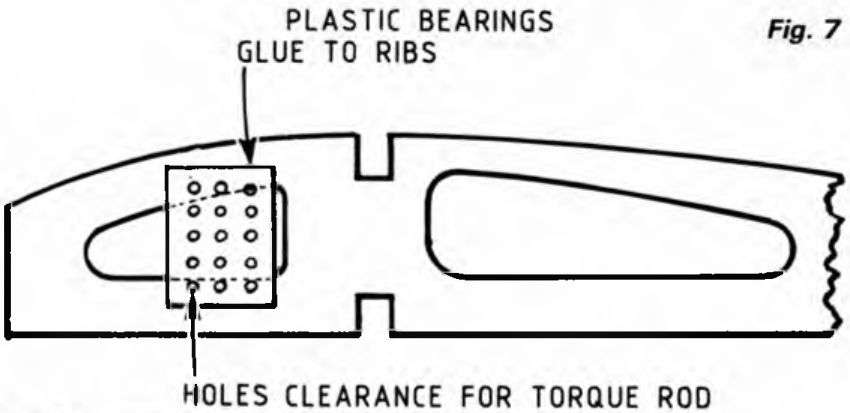


Fig. 6: Torque rod bearings

FLYLEAVES

The Smithsonian Book of Flight

by Walter J. Boyne (Sidgwick and Jackson, £19.95. ISBN 0 283 99675 7)

This is a splendid book. Eight decades of aviation history are masterfully described in ten chapters and nearly 300 pages. Many full-colour photographs provide graphic imagery, and besides well-known historic shots there are frequent, unexpected delights. The author is a former director of the National Air and Space Museum, and it is the Smithsonian Institution who have produced this volume; from its own resources come many of the illustrations.

The temptation to lean on chronology to tell the whole story has been happily resisted, and the result is a volume which captures much of the spirit of aviation and aviators. Of course, America achievement is stressed and if one wishes for detail then specialised research must be undertaken with other books for company. But to create a convincing single-volume history of aviation is one of the most difficult tasks in the world of aviation literature. This tribute succeeds compellingly. You'll love it! **GC**

Vickers Aircraft since 1908

by C.F. Andrews and E.B. Morgan (Putnam: £20. ISBN 0 85177 815 1).

Nearly twenty years on comes this new edition of an old favourite, updated and with many fresh photographs in its pages. Here is a story of development and refinement from airships and early monoplanes to Vanguard and VC10 via Vimy, Victoria, Valentia, Wellington and Viking. Model flying subjects abound: we favoured the private-venture Vixen family of fighters; and the link with the French metal aircraft designer Michel Wibault is an intriguing chapter at a time of little-known but fascinating prototypes.

Much of the book's strength comes from space given to Vickers projects. Included here are remarkable six-engined WWII bombers and astounding dual and triple-fuselage VC10 design studies, which, had they materialised, would surely have rated amongst the noisiest of civil aircraft....

Your editor, who spent much of his childhood gazing at Viscounts and Vanguards on test from Wisley, thoroughly enjoyed this volume, but it is a pity to report that some of the photographs were unaccountably fuzzy. Indispensible, nevertheless. **GC**

The German Fighter

by Rudiger Kosin (Putnam, £25, ISBN 0 85177 822 4).

This A4 format volume represents a new approach for Putnam, for it is a translation of the original German text, first published in that country in 1983. Rudiger Kosin's involvement in the aircraft industry spans sixty years, and it must be said that this is reflected in the quality of content. When dealing with this fascinating tale of development the book is much happier on the safer ground of the 1930s onward. Earlier coverage is sketchy and sometimes inaccurate. For example, the myth of Thulin-engined Fokker Triplanes is repeated here. Indeed, there is an inaccuracy in a footnote to the very first paragraph of the introduction - Roland Garros force-landed not in a Morane N but an L to set Germany on the road to their own monoplane success with the Fokker EI and subsequent E-numbers.

Nevertheless, this complicated story, effectively covering Fokker Spinne to Alpha Jet is enthusiastically told and reasonably

well illustrated, although photographs at the beginning of the book are of variable standard and odd choice. But those charming inter-war Heinkel, Arado and Focke-Wulf fighters are deftly described. It is a pity that the three-views are small and heavily drawn.

A fair account, but unimpressive in comparison with The German Giants from the same source at identical price. **GC**

Fold it - fly it; A new dimension in paper planes

by Dr. Edmond Hui (Patrick Stephens Ltd. £2.99 ISBN 1 85260 063 2).

Details for nine paper plane types are accompanied by theory of flight and flying techniques. Chief amongst the craft is the Paperang, Dr. Hui's own design which owes much to his hang-gliding experience and is essentially a swept-wing with tapered, folded leading edges. Various developments on the Paperang theme are described, and full-size patterns make for swift construction. Perhaps the book could have been condensed, but there is good trimming advice aplenty which would adapt well to more substantial flying models. But surely the best way for youngsters to enjoy paper planes is to give them a stack of A4 paper, a handful of ball pens for decoration and half an hour of your time... **GC**

SCALE MATTERS

Bill Dennis discusses trophy topics and we review books to inspire

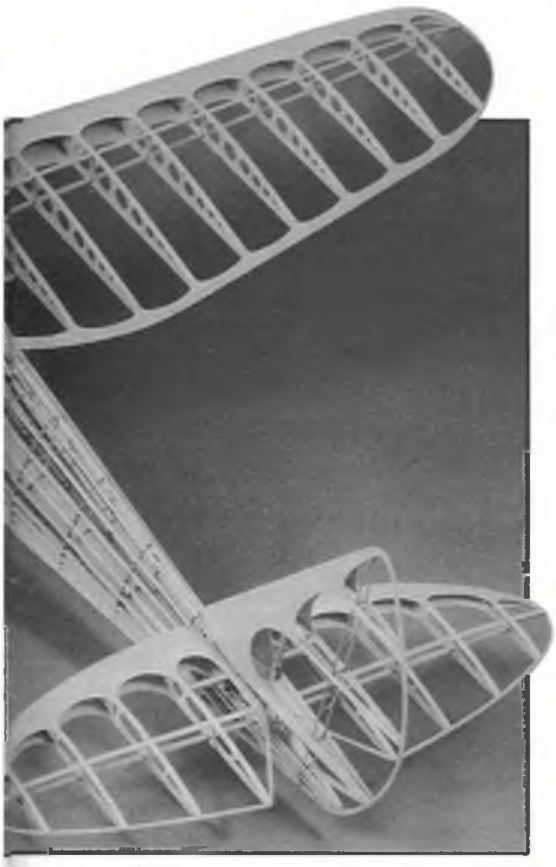
Heading: Superb framework of Arve Mozzarini's Breda 42. Seventy-inch rubber model dates from 1936! Go on, Arve – cover it! Photo from Roberto Marzoli. Above: Russian ChAI-1 from 1932 carried six passengers and just has to be built in model form – we have more gen including blue and silver scheme...

TWO EXTRA trophies will be up for grabs this season – one new, the other much older. Firstly, the Knight and Pridham trophy, donated to the SMAE, will be awarded to the winner of CO_2/Electric scale at the August Nationals. This means that now all our F/F events at the Indoor and Outdoor Nats have an award.

The other is the E.J. Riding Trophy, which I believe was the first cup to be awarded for F/F Scale. It was originally donated by *Aeromodeller* to the NW Area, and for many years it was competed for at the Woodford rally until that venue was lost to us in the late '70s. Thereafter it was transferred to the Woodvale rally until recently. It now languishes unused.

While it cannot be regarded as an object of beauty, this is nevertheless a very famous cup, and it is good news to hear that it is to come back into circulation. The NW Area offered it to the SMAE on loan for award at the Indoor Nationals, but as that meeting is fully subscribed for awards, an alternative has been devised. In any case, the Riding trophy was always associated with outdoor flying. Each season, all official SMAE F/F scale contests, indoor and outdoor, will be run on a league basis, with four points awarded for first place down to one point for fourth. Points will only be awarded where there are six or more entrants. The Cup will be awarded at the autumn Indoor meeting at Walsall.

I always associate the Riding cup with one of my more memorable crashes. The Woodford Rally was one of those good old fashioned do's where all disciplines were together; you'd get F/F duration models gliding through a combat bout, for example. My BE12b had just performed a perfect take-off and was climbing away very nicely, when a hundred yards away somebody twanged up a R/C glider on a bungee. By a million-to-one chance the BE flew into the line and the



Left: A twin from down-under. Gary Odgers' HP O/400, built from our columnist's drawings, is now covered and ready to go. Below: KSB timer operates simultaneous cut-out on Indian Mills .75 diesels.

old Mills promptly wound about two feet of 1/4in square rubber round itself, leaving the model dangling in a most undignified manner. I would have though a moderately skilful pilot could have brought his glider to earth on the line, but instead he unlatched and dumped the BE on the runway from about fifty feet. Happily the damage was minor, with just the fuselage snapped in half behind the cockpit. Fast epoxy fixed it in time to make another winning flight.

Having discussed the Riding trophy, the one blot on the horizon is that its present whereabouts are unknown! I'm not sure how such a state of affairs can arise, but if its current guardian would get in touch with the SMAE or *Aeromodeller*, the Scale Committee would be most grateful.

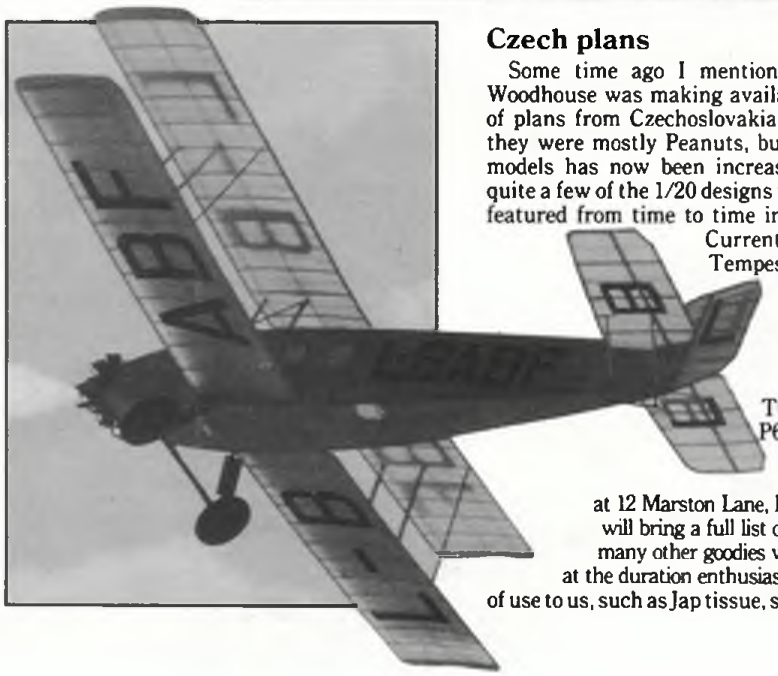
Below: Antonin Alfery's Peanut Avia BH-23 looks good - fuselage is from sheet foam. Flight times average at 80 seconds.

Strine flyin'

I have just received a letter from Gary Odgers in Australia. Gary, who flies both F/F scale and F1B, was over in England a little while back competing with his Wakefields. A picture of Gary's Albatros was featured in a recent Scale Matters.

This month's photos show his version of my HP O/400 (plans of which are available from SAMS) in its uncovered state; and a very fine piece of work it looks, too. It has now been covered with tissue and silk, and at that state it weighs 31oz - well on target for the original's 38-40oz. The secret to success with models of this type is a pair of good reliable engines, and Gary's Indian Mills .75s reportedly perform well in bench tests. It is interesting to see that Gary has incorporated a bomb-dropping mechanism; the original also featured this, but it became redundant when this option was dropped from the rulebook some years ago.

Gary is coming to England again this summer, this time to fly Scale. I hope he can bring the Handley Page!



Czech plans

Some time ago I mentioned that Mike Woodhouse was making available a number of plans from Czechoslovakia. At that time they were mostly Peanuts, but the range of models has now been increased to include quite a few of the 1/20 designs that have been featured from time to time in this column. Currently on offer are Tempest, Do 335, FW Tal52, Hel00D1, Mel09E and F, P-51H, Arsenal V6, Tupolev Ant 63, P63 King Cobra, and Oscar. An SAE to Mike at 12 Marston Lane, Eaton, Norwich, will bring a full list of the plans plus many other goodies which are aimed at the duration enthusiast but which are of use to us, such as Jap tissue, silk and rubber.

Paper Planes...

By Michael Johnson and Alan Austin (published by Grafton at £9.99. ISBN 0 286 50591 9).

This book is a delight. Ten classic designs are stunningly printed in full colour, ready for assembly into most attractive table-top models – or, bearing in mind the cover exhortation 'They Fly!', hopefully as subjects for conversion to CO_2 or electric power (the Knight and Pridham unit is specifically recommended).

Michael Johnson's work will be familiar to readers of *Aeromodeller*, for we have reviewed his previous offering Fantastic Paper Gliders; and an exposition of his techniques appeared in the 1988 issue. The compelling airbrushing is Alan Austin's department – and we must say that as an example of superlative artistic skill, the book can't be bettered at the price.

So-armed with scalpel, metal ruler and a selection of glues, we were ready to try 'em out.....

...really cut up

After a look at the potted descriptions of the full-size aircraft featured in this book, a start was made on the simplest subject, a charming Schleicher Rhönadler sailplane. Construction was speedy thanks to the reasonably all-encompassing diagrams and instructions which serve as a general guide, augmented

Planes from the book – Fairey Long-Range Monoplane goes well under rubber power; Hawker Hart looks great – destined for K&P .01 electric unit.

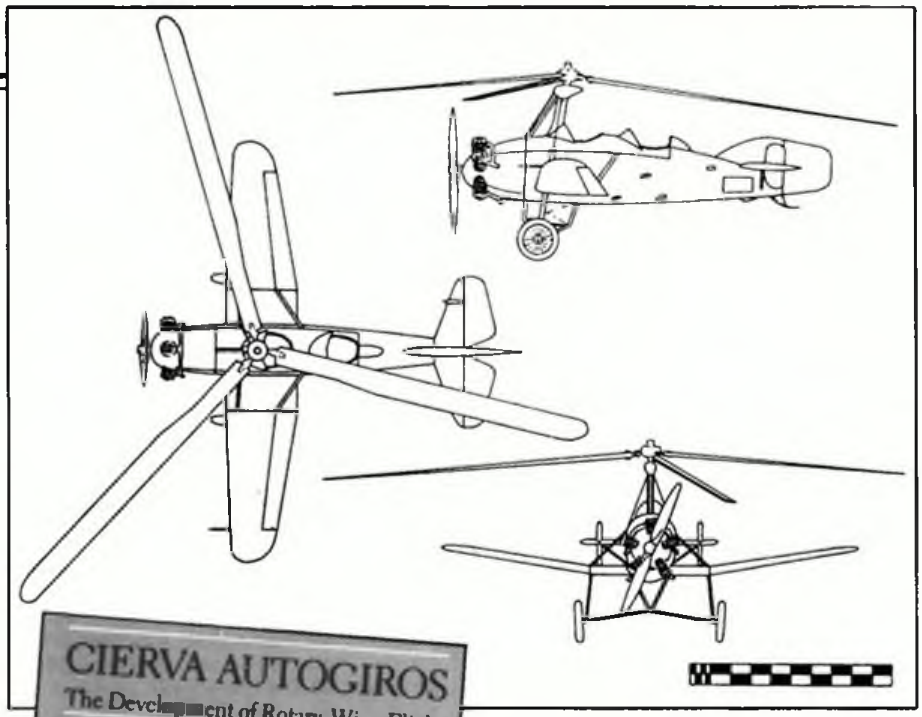
by details particular to each craft. The fundamental drawback with paper modelling is that double curvature, other than the very gentlest, is difficult to achieve, but fuselage construction in sections minimises the straight-line effect. The result was a pretty sailplane capable of perfectly satisfactory glides in the office corridor and editorial back garden. Wing construction, common to all the subjects in this book, incorporates scored spanwise lines from leading-edge to point of maximum camber with a section folded under the LE, back to where the mainspar would be, to create an elementary D-box. The section aft of this point is of single-surface thickness. The resulting wing looks best on the thinner-winged, pioneer craft like the Blackburn Monoplane, and less effective on the Fokker D VIII, for example - both of which we tackled next.

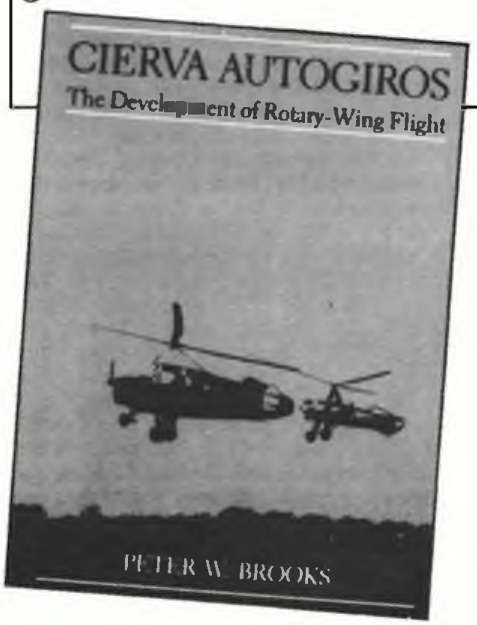
Building these models for flight demands local strengthening to absorb flight and landing loads, and, of course, to carry motor and ancillaries. Instruction on these points is sparse, and anyone without prior experience would find installation difficult. CO_2 motors and the Knight and Pridham electric unit are both recommended; mounting templates and full-size side elevations would have been an advantage. Having said this, the ideal CO_2 motor for the majority of the craft, which are rather smaller than ideal for Telco power, is a decent Brown unit, which is precisely what we chose for the Blackburn. Thus equipped, performance was reasonable, if too fast for scale. Naturally, an all-paper model will always be heavier than a tissue-and-balsa equivalent. The other side of the coin is that, given such splendid artwork, realism of the models in the book is exceptional.

All Blackburn Monoplanes will fly well. 'Flying Razor Blades' are a different proposition. Our model, K & P 01 equipped, persisted in sideslipping to port until a healthy tweak of washout was applied to both tips. Again, the model's small size, and thus fast flights, made it relatively tricky to trim. We played safe and modified the structure with balsa formers and a wire cabane, which involves a certain amount of draughting to ensure correct angles.

So far, quite reasonable. But our greatest surprise came with successful conversion of the Fairey Long-Range Monoplane to rubber power with a loop of one-eighth FAI and cut-down seven-inch Peck prop. This flew beautifully and was a craft we happily tried outdoors as well as in the Indoor safety of a local sports centre.

Still to be aired are the Fokker Triplane, which looks as thought it might be a handful, and the mouthwatering Hawker Hart, which is destined for electric power. Others in this book are the Morane Saulnier Type N, Savoia-Marchetti S-55, Ryan NYP Spirit of St. Louis and Avro 560. All are most presentable, particularly as static display models. Printing and cutting is excellent; just one or two wheels were slightly out of register. Care in assembly pays dividends, particularly when folded tabs are aligned; due allowance must be made for the thickness of the paper, or gaps may occur. And don't forget a thin spray of clear lacquer if outdoor flying is the target. Author Michael Johnson revealed that the original intention was to print each design to a slightly larger size; this would have made for more-forgiving flight characteristics. The Morane really is too small for anything except rubber conversion. But for less than a tenner we must whole-heartedly recommend this book. Inspirational value is high; flip through it and you'll see exactly what we mean. Perhaps you should buy two - one to create the models and the other as a reference work for airbrush technique!





Mentioned last month, reviewed here - autogyro enthusiasts will love this. TsAG1-A8 is just one type featured. Soviet subject might be worth trying as a model...

Cierva Autogiros

by Peter W. Brooks (published by Airlife at £19.95. ISBN 1 85310 040 4).

Misleading title, this. Not just those of Cierva manufacture but every autogiro is comprehensively detailed in this fine volume, which, we understand, was originally designed for Putnam consideration (certainly, the layout, and detail, bears this out).

Safe, low-speed flight has always been a foremost aviation target. Cierva's contribution, all based on the concept of the autorotating rotor, led from investigation of toys, via sound mathematical theory to the intricacies of collective and cyclic pitch control - technology which linked directly to helicopter rotor systems, as fully explained here. But besides autogyros of Cierva design, a multiplicity of types from the reliable to the bizarre gives the reader constant opportunity to puzzle or marvel - almost page after page. Types for aeromodelling consideration abound, although the scale autogiro is a much-neglected type these days. If anything can inspire anew, this is the source. Subjects from Russia, Germany and Japan, add spice to the more familiar products from the US and UK. Read - and be enthralled!

Lympne-Scale spectacular

Put Golden Era Day at Old Warden (16th July) in the diary now, for this will be the venue for the 1989 Lympne-Scale event. Last year's event was blasted by weather which would have grounded the full-size aircraft - so here's hoping for kinder conditions this time. Fancy a go? Here's a reminder of what's what.

Choose your favourite subject from the Lympne ultra-light aircraft Trials of 1923 and 1924 and we'll send you a documentation pack to create a 5/6in:1ft replica for CO_2 or electric power. Augment this with your own documentation, read the competition rules, and prepare to compete in Longest Flight, best Aggregate and Precision Landing. Static judging is self-assessed, and the overall winner will also be rewarded.

Subjects are as listed below.

1923

ANEC 1, Avro 558, Avro 560, DH53, Gloucestershire Gannet, Gnosspelius Gull, Handasyde, H.P. Sayers, RAE Hurricane, Parnall Pixie I and II, Poncelet, Vickers Viget, English Electric Wren.

1924

ANEC II, Avro Avis, Blackburn Bluebird, Bristol Brownie, CLA 2, Hawker Cygnet, Parnall Pixie III and IIIA, Short Satellite, Supermarine Sparrow, Vickers Vagabond, Beardmore Wee-Bee, Westland Widgeon, Westland Wood-pigeon.

Build a BUTTERFLY!

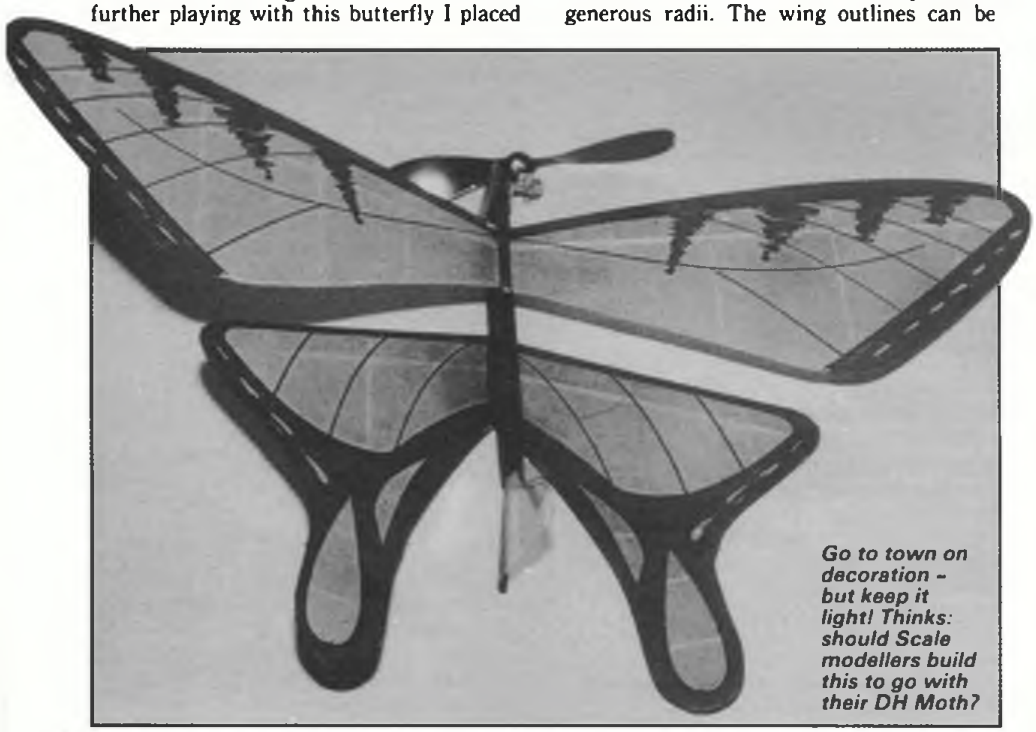
Here's a change – Al Backstrom's cheerful Swallowtail hails from Stateside. Be first on your block!

OF ALL nature's flying creatures, none is more fascinating to me than the butterfly. These dainty little things perform flying manoeuvres that I do not pretend to understand, but the colourful fliers with their erratic performance led me to want to build a model based on them. I do not have the ability to build an ornithopter version so I decided to try one in fixed-wing configuration. My first thought was to build one of the pre-WWI Cleveland kit versions. I obtained a drawing of this model but put it aside because it seemed too complex to justify my desire to experiment. Later I thought of building the butterfly as a simple profile model that would meet the Flying Aces Club (FAC) NoCal rules (*simply put, NoCal rules are for profile-fuselage rubber scale models. GC).* The model presented here is the result. If you care to research it, you will see the influence of the Cleveland design in several areas. After further playing with this butterfly I placed the wings in a more scale-like location, with both slightly overlapping on top of the fuselage. However, it flies better with the wing layout shown on the plan. If you would like your butterfly to look more realistic the wings should be built as one unit. I intended to use the aft portion of the rear wing to trim, but that has proven ineffective. If you desire another type of butterfly the rear wing can be shaped differently, according to your own research. It will fly just as well!

Build your butterfly

The actual construction of the model is so simple that anyone who has previously scratch-built a model should have no trouble. The thrust bearing, which is bent from a strip of soft aluminium as shown, allows an almost infinite adjustment of the thrust line. Bend it on a mandrel so you have generous radii. The wing outlines can be laminated from 1/32 x 1/16in balsa, or may be bent from bamboo. The wings are best built one on top of the other to ensure they are identical. The wings should be covered before joining the halves. Assemble the front wings with two inches of dihedral and use them as a jig for the rear wings. Place a piece of wax paper over the assembly and glue the rear wings together on top of the wax paper to duplicate the angle. The body should be made from hard 1/32in balsa sheet. Use a stiff piece of transparent plastic for the fin, the thinner the better. During initial assembly the front wing should only be tack-glued in position.

Decorating the butterfly presents the most work. The markings I used are indicated on the plan. These are rather like the giant swallowtail butterfly of North America, which is black and yellow. I coloured the body with black ink felt tip marker; the bond paper face is white with blue eyes but a yellow paper would have been better. The wings are yellow Jap tissue with black markings applied by ink marker. The tissue should be pre-shrunk and given one coat of dope before the markings, which can be as elaborate as your artistic ability will allow. If you eliminate the aft portions of the rear wing the markings from many other butterflies can be used more authentically.

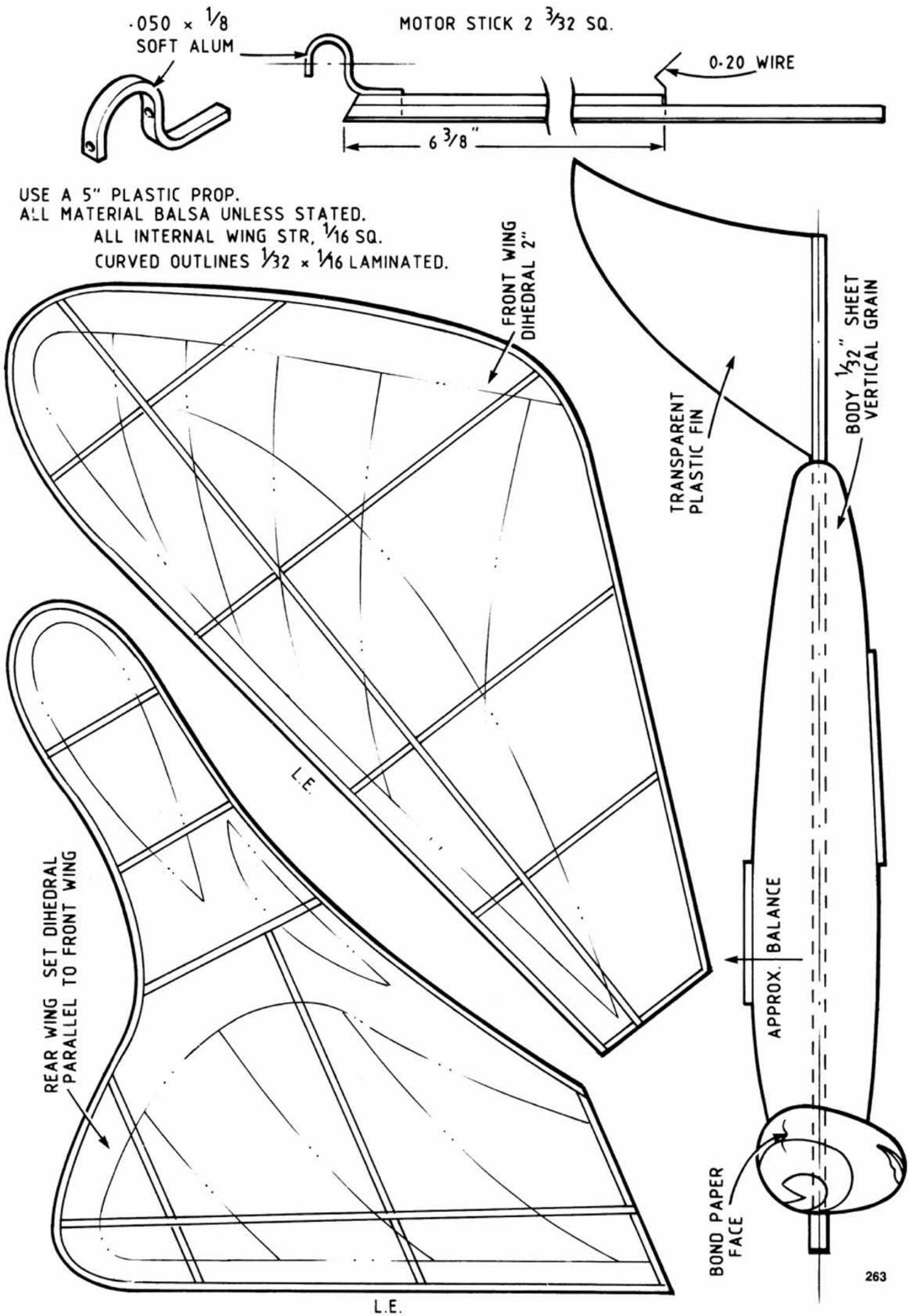


Go to town on decoration – but keep it light! Thinks: should Scale modellers build this to go with their DH Moth?

Fly it!

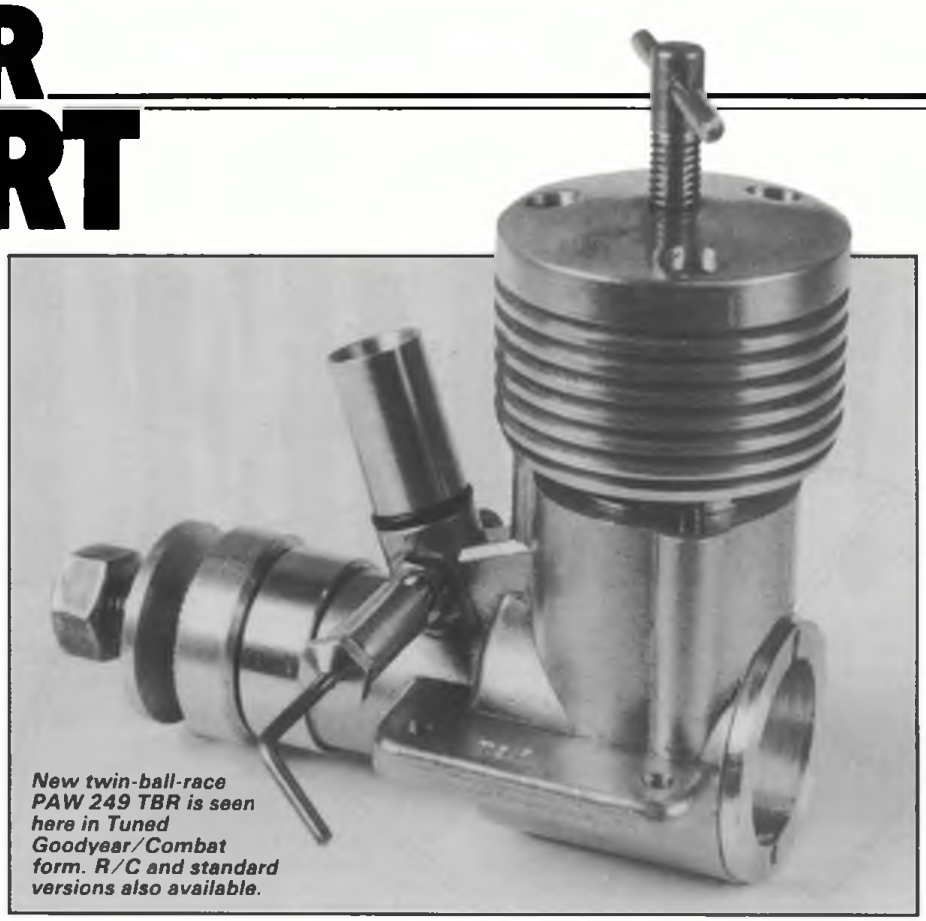
The butterfly should balance at the spar of the front wing. Install a loop of 1/16in rubber about twelve inches long, doubled on itself for the purposes of balancing and test glides to prevent it flopping about and causing undesirable CG shift. Test over grass if possible. The glide can be adjusted by packing under the front wing leading edge to correct a dive; and under the trailing edge to prevent a stall. This surface should be only tack glued in position until trimming is complete. When a satisfactory glide is obtained restore the motor to single-loop configuration and wind on about 100 turns. Correct any stalling tendency with downthrust. If the butterfly dives under power use less downthrust. The drawing shows the thrustline required by my model. When the butterfly flies well with 100 turns, increase by 100-turn increments and make corrections as required. Use sidethrust to adjust the power turn, trimming for glide turn with the fin. I wind the model by trapping the plastic prop in a stooge, then using a winding tube, so that rubber breakage will not destroy the wings.

Enjoy this delicate performer. Even the radio boys will look up!



MOTOR MART

Diesel topics. Jim Woodside evaluates the PAW 29 RC...



New twin-ball-race PAW 249 TBR is seen here in Tuned Goodyear/Combat form. R/C and standard versions also available.

THE WORD once was that larger-capacity diesels did not run really well. Further, they wouldn't throttle well. But these rumours, like so many others, are now mere tosh.

Since 1984 I have put in an estimated one hundred hours of air time with my Junior 60. Not surprisingly, after such a pounding the time came for a change of bearings in the trusty Saito 30. My local supplier found difficulty – perhaps I should have gone to the main agents in the first place - so I took the opportunity to install a new PAW 29RC, which I had recently obtained in a swop for a nice ED 3.46. Installing the engine was easy, thanks to the paxolin plate mount.

When all else fails, read...

The PAW instruction leaflet is one of the best. An enthusiast new to diesels is strongly recommended to follow its sound advice. Even if you are familiar with small diesels the starting characteristics of a motor this size will probably have to be learned anew. Acquiring a sufficiently strong flick is something of a knack, especially when the engine is new and stiff. My usual preference is to run-in motors in the air, but here is a case for a few bench sessions. A heavy prop, like a Graupner 12x6, will help with flywheel effect; and an oil fuel, as prescribed in the instructions, is essential at first.

Perseverance will soon bring success. Thirty minutes' running will bed-in the motor, but it will need at least two hours-worth before it begins to deliver its best. A tiny hole drilled in the silencer ring (dissemble the engine first, to prevent swarf getting to vital parts) is a great help, allowing a prime via hypodermic needle.

Testing, testing

Test flights revealed that a 12 x 6 wood prop gave more than adequate power, but the tickover was too high to allow landing. Instead, the power had to be cut; most inconvenient. On a glow motor the solution would be to weaken the idle mixture by opening the air mixture screw, but the PAW's simple carburettor lacks such an adjustment. Tony Eifflaender of PAW recommended that the air bleed hole should be opened up in 0.1mm increments. In this case, all that was needed was an increase from 1mm to 1.2mm.

Diesel joy

Starts are now excellent and throttle response through the range is impressive. The real joy is to be able to visit the flying field with a minimum of equipment. Often I will fill the tank before leaving home. Only the model and transmitter are needed to accumulative a happy half-hour's flying time.

Disadvantages? Fuel costs are higher than for glow engines but no two-volt accumulator, leads or clip are needed. Diesels produce a good deal of oily exhaust residue, best dealt with in this case by an extension of plastic tubing. Once the motor has been run-in, the oil content in the fuel may be reduced. It is essential to note that this last method is in contradiction of the maker's instructions, but for relatively under-stressed use, such as Vintage F/F or R/C, you may proceed with caution. Now that my motor is well run-in I have reduced the oil content to only fifteen per cent with no ill effects. If you try this, reduce in gentle stages and err on the side of a slightly richer run than optimum.

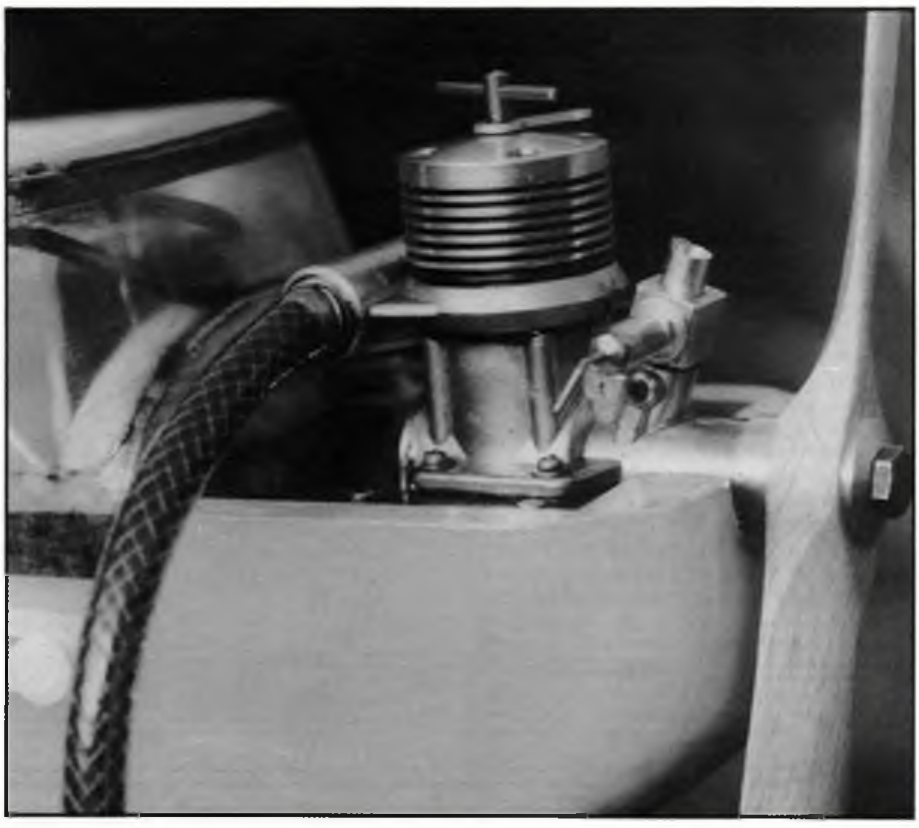
My Junior 60 weighs about four pounds and the PAW 29 flies it with ease. The change of powerplant has revitalised my interest in the model. Highly recommended!

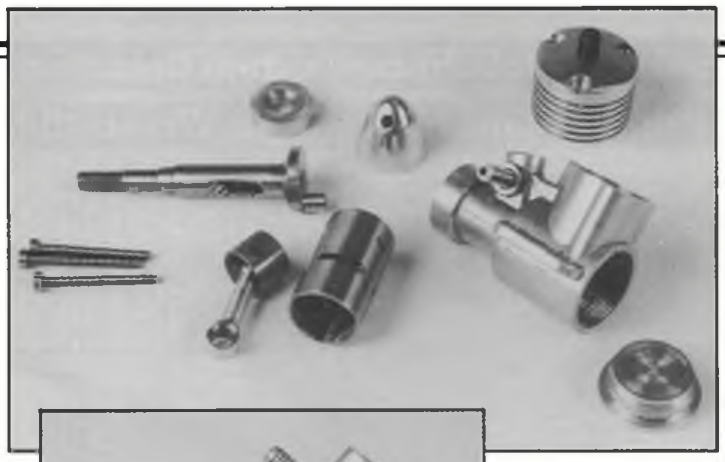
The PAW 29 RC costs £41.40; it is available from good model shops or direct from the factory.

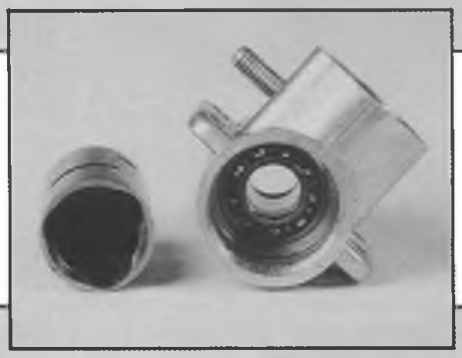
PAW progress

New PAW engines are the 249 TBR (twin ball-race) and its smaller brother, the 80 TBR. Photographs show the 249 in Goodyear-tuned trim; the 80, also works-tuned, is the very motor which Tony Eifflaender used to clock

PAW 29 RC ready to go in Jim's Junior 60. Throttle range excellent - an airbleed modification is described in text.







	80 TBR tuned	249 Goodyear tuned
Bore	.400 in	.580 in
Stroke	.377 in	.575 in
weight	2.25 oz	5.5 oz
Capacity	.776 cc	2.4909 cc
Mounting	as STD 80	As all PAW 249s, 1957 to present day
Dimensions		As 80 TBR
Fuel	Mk1 and Mk2 castor 15% Ether 35% Paraffin 48%	
IPN 2% Performance	.18 bhp 25,000	.48 19,500
Prop figure	Tornado 7 x 4 10,000 Topflite 6 x 3 19,000 Tornado 5 x 3 24,000	Taipan 8 x 6 13,500 Taipan 8 x 4 15,000 Taipan 7 x 4 19,200

Structural Data

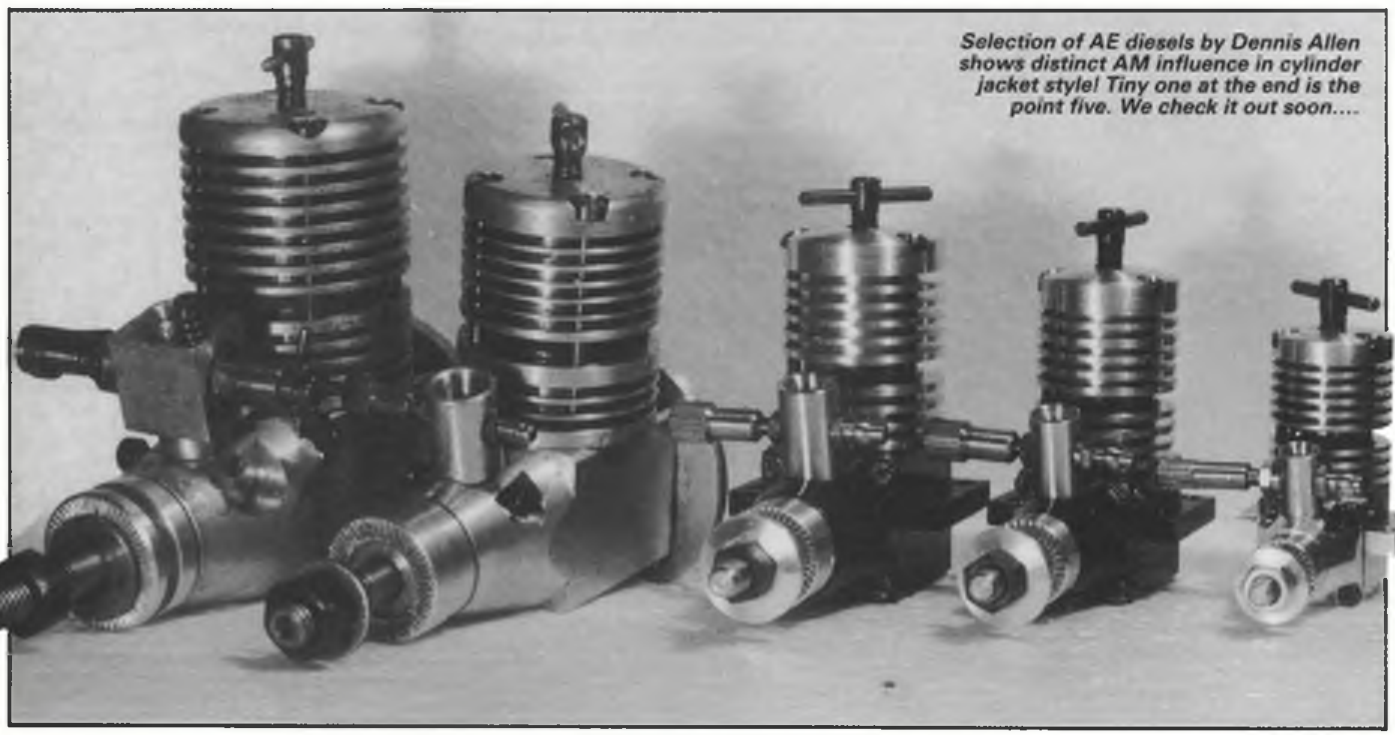
Crank case	Cast alloy	Cast alloy
C/shaft	EN8 Hardened &	EN8 Fully hardened
Cylinder	EN8 Hardened	EN8 Fully hardened
Bearing	7 x 14 x 3.5mm Rear	12 x 12 x 5mm Rear
	7 x 14 x 3.5mm Front	7 x 14 x 3.5mm Front
Shart journal diameter	7mm	12mm
Shaft thread	28A	1/4 UNF (28 tpi)

Left: Another new PAW – the 80TBR is the latest development of an established favourite. Extra bolt holes at rear of lugs are to fit Tony Eifflaender's Class I d Speed model – this is his own engine. Components at top left; ball race and cylinder details above left.

an impressive 90.6 mph in Class I speed at the 1988 Nationals. The TBR range has been developed over the last couple of years. Basic design is traditional PAW, so despite internal modifications to liberate more power, prices remain at a very reasonable level.

All the TBR range are available in R/C form, with or without muffler. The Goodyear version is targetted at the Diesel A flier as well as the racing enthusiast. Details are tabulated above.

The 80 TBR (and the 100, its 1cc brother) retails at £46; the 249 TBR at £49.95 in standard trim and £51.75 for the Goodyear/ Combat Special. See the advertisement in this issue for prices of the other motors.



Selection of AE diesels by Dennis Allen shows distinct AM influence in cylinder jacket style! Tiny one at the end is the point five. We check it out soon....

BUILD FROM OUR FULL SIZE PLANS!

Fly Fun Scale with Rob Presnell's 38in Canadian charmer. Plenty of time before Scale Weekend!

Found Centennial

THIS MODEL was originally enlarged three times from a Walt Mooney Peanut plan. Actually, the whole thing was started very much on the spur of the moment. The plan was drawn, and the fuselage sides built, in one evening. That's how it stayed while I sought more information. Much help came from David Boddington's R/C plan of the same aircraft (presented as a fullsize plan in a 1984 issue of Radio Control Scale Aircraft Quarterly).

Within a week the airframe was complete. A true Fun Scale model, the FC 100 has been built with minimal reference to full-size detailing, but it's a fine performer, and when decorated in red and white looks quite delightful when airborne against a blue sky. You remember blue skies?

Found out

Construction is straightforward. Identical sides are built one on top of the other and carefully aligned via formers and spacers. Everything must be square. Careful wood selection – longerons, particularly, should be from identical stock to ensure a twist-free framework. White glue (PVA) gives you plenty of time to make accurate joints. Cardboard or balsa jig formers may also be used. Another useful dodge to adopt with the traditional box fuselage is to use small, triangular sheet gussets at each corner of the major uprights and spacers, but accuracy in cutting is vital.

A light tail and fin will save nose ballast, but, as ever, remember that light doesn't mean flimsy. Careful wood selection is a must. Cover the model in white Jap tissue. Spray the fuselage with water and carefully steam-shrink the wing and tail. Pin the latter to a flat surface until dry. Dope the wings and fuselage with a 30/70 per cent mixture of dope/thinners to which a few drops of caster oil has been added (this prevents the tissue from becoming brittle). Tail and fin are given a coat of thinned banana oil. Thin acetate is used for cockpit glazing. My daughter discovered some blue-tinted acetate, which certainly adds character even if it's strictly non-scale. I used epoxy adhesive but R/C Modellers' Glue is perhaps an even better choice.

Power on!

The prop assembly shown works very well, but there's plenty of room for experiment. Trevor Faulkner's article on prop carving – to appear next month – will be invaluable if your Found prop is your first!

Power is provided by six strands of 1/4in. flat rubber, 36in. long, pretensioned and lubricated with castor oil or purposely-formulated rubber lubricant sold by suppliers such as SAMS – see their advertisement.

My model needed a few grams of nose-weight to balance where shown. Total weight was five-and-a-half ounces. 3/32in. packing under the tailplane trailing-edge was enough to give a satisfactory glide. Your model may need less. Start with 1/16in. Power flight was straight off the board. Two hundred hand-turns should be enough to fly a complete right-hand circuit. If all is safe, build up to a maximum of 680-700 turns. 1/16in washout on the starboard wing is recommended.

This is a model that will have you running round the flying field for hours. Beware when flying in thermal conditions – it might just be tempted, and whoever heard of a scale model fitted with a dethermaliser!

BALSA CUTTINGS

Cyano de Bergerac takes a sharp scapel to aeromodelling matters of moment

The March of Timer

How do you think our present sophisticated notions are going to stand up in half a century? Are they going to say, 'They were properly clued up in 1989, you know!' or – 'Would you believe those old boys really thought such a thing as tip stalling existed?'

Because at the time of writing it appeared exactly fifty years ago, let's take a look at Flying (3d. every Friday), February 25th, 1939. Then, we were hardly children at the aeroplane game and indeed had reached a point at which the single-seat piston-engined fighter was so refined that within two short generations spanning only six short years, we were going to refine it out of existence altogether. The magazine was authoritative enough, having been edited by none other than W.E. Johns, whose fame shall be everlasting (Oh, the morals of Worrals – no wiggles for Biggles!) But for a' that, and for a' that, as the poet Burns said, betraying thereby a regrettable tendency towards repetition, is not some of the information conveyed just a leetle open to the sideways look? We find all this on one page (5): A tale that a new 'Messerschmitt Bf 109' has been swanning around at *more than* 470 mph. Beside it, a short item about a Curtis Hawk 75A (Oh, dear – don't you know *anything?* A *Mohawk!*) diving at 575 mph. The speed is said to have been made possible by a new type of airscrew. (Nothing about a new type of non-pulloffable wing and tail unit.) Bearing in mind the above speeds, one looks at a captioned photograph beneath concerning an all-metal two seat Merlin-engined Boulton-Paul fighter monoplane for the RAF, believed to be the fastest warplane yet to go into production. So that would *have* to be a fast one. Even with the turret.

That completely random sample maybe wasn't quite spot on, was it? Well, a good fifteen per cent of the mag was devoted to model aircraft, and if we pass over a Royal Air Force advert with an arrow pointing to the rear cockpit of a Wellesley saying somewhat unconvincingly This Is The Place For You, we come to it, sharing space with an advert for Tit-Bits (2d.) The modelling man was F.J. Camm, who makes us feel at home at once with mention of a Lysander kit. Do you complain about the cost of kits today? Well, this one was 10/6d., which seems a lot for a 25in span rubber job when in the next column a fully-equipped ex-factory Chilton DW 1 was being offered for £315! However, to business. Let us take another three bits, all from a single column. Start with an admission to a reader that no satisfactory means of controlling a model aircraft by wireless has yet been devised. Well, that held good for long enough, Heaven knows. And next – the man says that if properly counter-balanced a single-bladed airscrew would work but you would not note any improvement and there was little advantage in this probably more troublesome means of achieving the same end. Now *there's* a prophet who deserved honour in his own country.

But then he goes and answers another letter with a firm statement of his belief that it is not feasible to propel a model aeroplane with an electric motor. Chris Coote, Roy Ashby, Robin James – where were you then? However, two right out of three across fifty years puts the modellers way ahead of the full-size brigade, thanks to F.J. Camm. Yet what is this? To the bit about electric motors being not on, Camm added for no apparent reason that a clockwork motor was out of the question. Now that was asking for it. If you see your columnist at Walsall or Watford with a little indoor job chuffing around behind a Tomy timer, you'll know it's a wind-up.

T.O.M.S.

Suppose you reckoned you were going to write an epic about aeroplanes that would out-shoot Neville Shute and submitted an outline like this. By the age of 22, your tough, well-off, good-looking hero has already done all the ballooning that is good for anybody, has had a hand in winning a notable yacht race, is running around in a dirty great Napier and is part-owner of quite a passable schooner. He meets Bleriot, buys a kite of his own which he succeeds in pranging on the day it arrives, yet before his next birthday has pressed on to win air-race prize money equal to a year's pay for a hundred working men. Next, he goes off to America where he (inevitably) meets the Wrights, has a prang, wins umpteen contests, has another prang, comes home and teaches Trenchard to fly. (ACM Sir Philip Joubert once quoted a report that Trenchard was a bad and dangerous pilot.) At Brooklands (where else?) he designs and builds flying machines, has a go at the Schneider Trophy, marries the daughter of a baron and makes a contribution to the 1914-18 war measured in terms of maybe twenty-five thousand aeroplanes. They make him a CBE, modest enough recognition for giving us the Tripe, Snipe, Camel and Pup, but never mind – later in the book his outfit also gives us the Hind, Hart, Fury, Audax, Hurricane, Typhoon, Tempest, Meatbox, Hunter and Harrier, so he does get a knighthood. By then he's 65, but he does get it. His genius not only steers him through the commercial quicksands of the inter-war years, but permits him to spend much of them mucking about doing his favourite expensive things. His ability to fly an aeroplane with one hand and take the helm of an ocean-going yacht with the other whilst building an empire which later develops into British Aerospace is partly explained by the wholly improbable fact that in time, the bunch of absolute nobodies he took on in the beginning turn out to to have been Harry Hawker, 'George' Bulman, Fred Sigrist and Frank Spriggs all along – not to mention Sidney Camm, brother to the prophesying Camm of that same ilk hereinbefore referred to. Naturally, your hero is made an FRAeS, becomes very rich indeed and lives to be a hundred and one. A plot of such extravagance would curdle the blood in any publisher's tea-cup.

Balsa Cttgs. would like to acknowledge with respectful wonder the passing in January of one of the greatest aeroplane men ever. Thomas Sopwith's name will be heard amongst us for as long as scale models are made.

No whey she'll come back

Fly sensibly. Remember – Little Miss Muffet, Decided to rough it, Camping at Eaton Bray. There came a big glider, Which landed besire her, And frightened Miss Muffet away.

Super old pic from the archives: Bunny Ross' petrol job dwarfs other notables, including a Bowden boat (or is that two?), A.H. Wilson's tailless and Reg Parham's 1947 Gamage Cup winner – all on the SMAE stand at a 1947 Exhibition...

FROM THE HANDLE

Freeze a jolly good fellow! Claus Maikis turns the video camera on C/L Stunt manoeuvres...

MEN LOVE toys, especially when they are expensive luxuries. Video cameras are very popular these days; certainly, they can capture the whole of the rest of our lives on tape. When considering buying one I immediately thought of an ulterior motive. Could video be used to help with aerobatic practice flying? In my mind I could see flights played back on the TV screen; mistakes could be easily detected, and then eliminated - and lots of trophies could easily, and often, be won...

Sequence of events

As it turned out, things were not so simple. Nevertheless, there was much of interest to be gained from F2B videos. Apart from lots of fun watching pilots, in close-up, doing their thing in (more or less) graceful motion, the 'advance frame' facility offered new insight into the world of manoeuvres themselves. I filmed several sequences, chose the best and watched them in slow motion to determine exactly where a given manoeuvre started and finished. At first I timed the duration of the manoeuvre (let's take the square loop as an example) as performed by several pilots. Average time was three seconds. Then I advanced one frame at a time, and counted every single picture. This is how...

I began at the start of the first (bottom left) corner. This was frame No. 1. At the end of the corner the number of frames advanced was noted. The same procedure was followed for the rest of the manoeuvre (see Fig. 1). The average figure, taken from

the efforts of several pilots, was 150 frames, which we can call 150 time units.

Now the number of time units for each part of the manoeuvre can be worked out. See Fig. 2.

The number of units in the whole manoeuvre is known, and so is the time taken to perform it - say, 150 units in three seconds. Each time unit is thus 0.02 seconds. Thus the exact time for each part of the manoeuvre is known. As an example, Fig. 3 shows a square loop performed by Attila Morotz at a recent contest in Salzburg.

Astonishing, isn't it! Think about what happens. At a certain instant we have to apply a given elevator deflection, hold it for a precise length of time, and then return to neutral at exactly the right moment - and all within 0.28 seconds! And this is just the first corner. The second one is upon us, and then the next, and the next... Also, the whole manoeuvre must be geometrically exact, and the second identical to the first... I'm really amazed at the extraordinary reaction time we Stunt fliers need for precise execution of the schedule. How can anyone doubt the sporting nature of our flying?

I checked square loops performed by several pilots. Results were different, of course, depending on flight time (line length and model speed are factors here) as well as

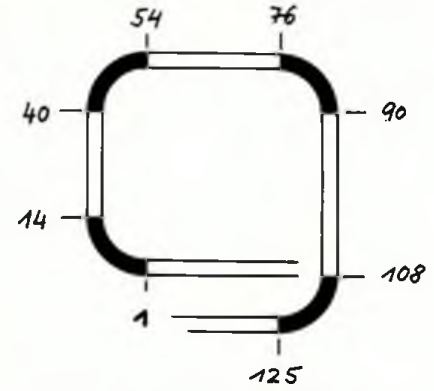


Fig 1: Frames per manoeuvre

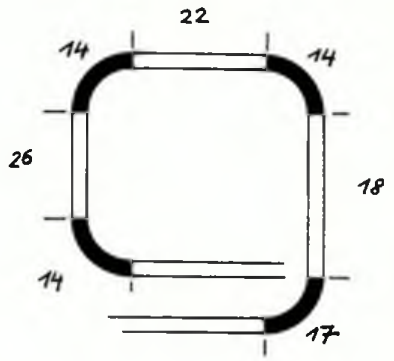


Fig 2: Time units per manoeuvre

Square loop analysis described by Claus. Average times taken in Figs 1 and 2; manoeuvre in Fig 3 performed by Attila Morotz.

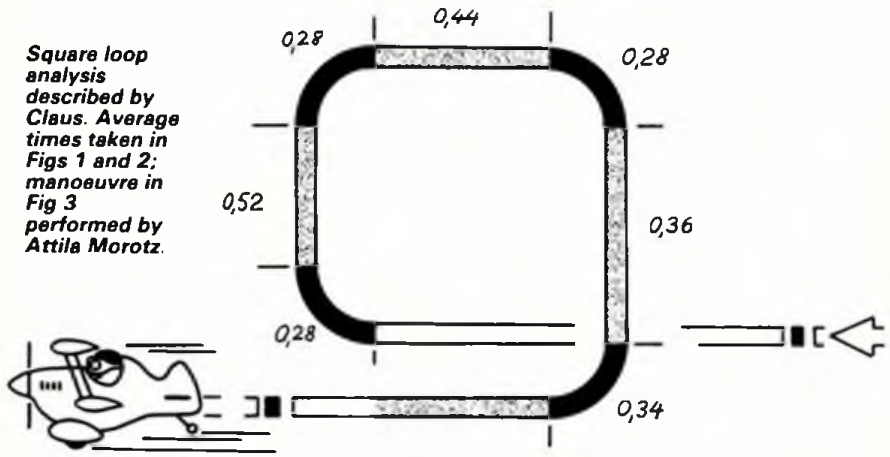


Fig 3: Time, in seconds, to perform square loop

Trio of Nats photos shows, right, Ian Ward's military-styled Stiletto; far right, Maurice Doyle's latest A for Andromeda; and centre, Dave Harrison's potent USE glow for FAI combat. Prop bears battle scars!

pilots' reactions. All square loops filmed were in the range 3-3.1/2 seconds. Morotz' were the most exact, so I chose them as reference.

Twist your wrist

While my pocket calculator was hot, I had another idea. Suppose a model is flying at five seconds per lap. At a radius (that is, line length) of twenty metres, or 65.1/2 feet, this is a distance per lap of 125.6 metres. So every second the model flies for 25.12 metres. Now let's take the wingover as an example. At just the right instant the pilot has to apply sufficient elevator deflection, hold it, and then return to neutral. Just as for the square loop, of course. Immediately after the pullout he's just 1.5 metres high (five feet). Suppose he's a good pilot. What's the margin of error at this altitude? This:

$$\frac{\text{one second} \times 1.5 \text{ metres}}{25.12 \text{ metres}}$$

$$= 0.0597133 \text{ seconds}$$

To put it quite simply - if you twist your wrist 0.0597133 seconds too late, it's back to the drawing board!

Now, not all pilots fly at this speed. It's not difficult to find a slower rate; say 5.1/2 sec/lap. This comes out at (pause for calculation) 0.065 seconds of margin for the same pullout. An immense gain! And remember, the whole calculation is based on model speed in level flight. In the dive, speed is much higher. Refer back to the diagrams for evidence.

I really never thought our reaction time was so quick. How do we do it? *(Couldn't resist a footnote here. Interesting results can be obtained by scrutiny of any activity which has to approach a finite limit as closely as possible. Motor racing lap times, and the exact passage around the circuit, is another. Just as fascinating is analysis of the occasional mental glitch which takes the path from safe to unsafe. In this case, that's when one stacks one's model. Any other views? GC)*

...Reg Lowe rounds up the 1988 CLAPA league...

EVERY YEAR the Control Line Aerobatic Pilots' Association collates the season's F2B and Class 2 Open Aerobatic results. League places are based on the following points. First place: 50 points, second, 49; third, 48; and so on. The best seven results cound in F2B, the top four in Class 2.

For the first time in the ten-year history of the F2B League there has been a tie for top spot. Tony Eifflaender's equal first places breaks Bill Draper's unchallenged monopoly. Congratulations go to Richard Handscombe - a name to watch in the future - who has graduated from Class 2 to F2B, where he placed sixth in his first season. Richard has been awarded the CLAPA Spitfire Trophy as the most improved flier during '88.

F2B League

		Points
1	C W Draper	350
=1	A C Eifflaender	350
3	N Dickinson	337
4	P Robinson	336
5	P Millar	324
6	R Handscombe	312
7	J Kergon	307
8	I Ward	287
9	G Alison	263
10	I Galt	242

42 flyers took part in 19 competitions

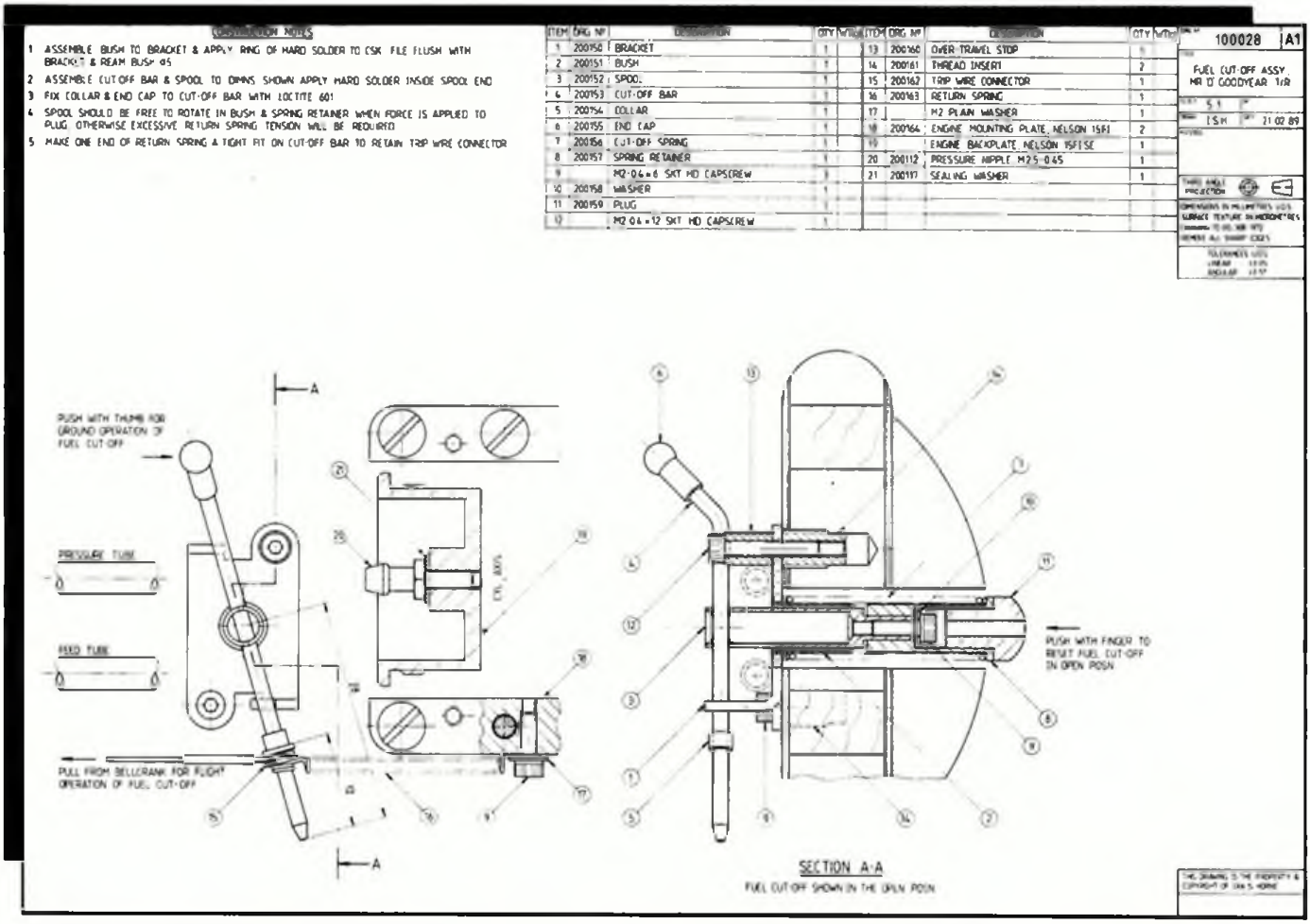
Class 2 League

		Points
1	B Temporal	199
2	J Wing	194
3	J Smith	193
4	D Bratton	181
5	T Lloyd	149
6	J Major	141
7	B Sylvester	140
8	M Howard	136
9	R Handscombe	100
10	P Carrington	98
=1	A Snowdowne	98

Note that Richard Handscombe is promoted from Class 2, having broken the points promotion barrier on a number of occasions in F2B. Given the fine support for Vintage Aerobatics, the clear message is that Aerobatics in the UK still musters healthy support. Rumour has it that Jim Mannall is coming out of retirement in the coming season. If so, F2B should prove interesting! Looking ahead - the Eurochamps at 3 Sisters in July gives everyone the chance to see Europe's best in action. Don't miss it!

...and Ian Horne describes Goodyear cut-off systems

MANY OF today's Open Goodyear class team racing models run with crankcase pressurised fuel systems that require simultaneous restarts. Originally the most common method of achieving this was to use a 'mousetrap' type of device, comprising a steel bracket and 14swg wire spring held away



Cut-out construction detail at just over full-size. Ian can supply comprehensive instruction sheets for a small consideration. Drop us a line – we'll do the rest.

from the bracket by a simple latch system. Flexible rubber fuel and pressure connections were arranged to pass between the bracket and spring. Operation of the cut-off by application of 'down' elevator caused the spring to be released from the latch and pinch shut the twin tubes. The merits of this device were simplicity and ease of manufacture, but it was not without fault. Simultaneous closure of the tubes could only be guaranteed by careful design and manufacture. Secondly, opening the device during restarts was slow, and occasionally unreliable.

Cut-offs used today are usually varieties of the sprung and latched 'T' shape; fuel and pressure tubes pass either side of the 'T' column and under its head. This arrangement overcomes the faults of the 'mouse-trap', at the expense of simplicity – which just goes to prove that 'you don't get owt for nowt'.

Development

Several currently successful designs differ only in the latch mechanism and thus the method of ground operation. The system described here was developed to allow the cut-off to be operated by the left thumb of the mechanic rather than the more usual (and potentially dangerous) action of moving the right hand over the propellor to push the elevator down.

It incorporates a detent notch which allows the mechanic to temporarily open the cut-off without latching so he can prime the engine intake. Mechanics who start their engines with the cut-offs open can this feature.

The first version of this design fixed the spring retainer to the spool, but excessive bellcrank force was required to overcome the rotational resistance of the compression spring. This problem was overcome by allowing the spool to rotate independently of the spring retainer. It was also thought that enthusiastic use of 'down' elevator could cause the cut-off bar to rotate too far. This potential problem was solved with the addition of an over-travel stop. The original fixings were self-tapping screws but they were prone to loosen.

Although the design is arranged around the low wing position of the Mr. D aircraft it can be adapted to high-wing designs by making a mirror image copy of the bracket and placing the bellcrank wire and return spring at the top of the cut-off bar. It may even be possible to dispense with the return spring and use the torsional properties of the cut-off spring to rotate the spool.

Description

The device comprises of a 'U' bracket to which is hard-soldered a brass bush. A stepped steel spool with a hard soldered cut-off bar is allowed to slide and rotate in the bush. A compression spring is constrained between the rear of the bracket and a spring retainer which is fastened to the spool step by a screw and washer. The retainer is allowed to rotate independently of the spool. The spring retainer is fitted with a shaped plug to prevent hurting to the mechanic's finger. The bracket is attached to the model with two M2 screws which engage in aluminium thread inserts permanently fixed to the model. A multi-strand wire connects the bellcrank to the lower end of the cut-off bar and it is retained by one end of a tension spring which stretches forward to be fastened to the lower engine mounting plate. The upper end of the cut-off bar is cranked outward to clear the fuselage side and is provided with an end cap to prevent discomfort to the mechanic's thumb. The assembly is mounted 15-20mm behind the engine and 6mm below the thrust line so that the pressure tube lies between the upper bracket leg and spool whilst the fuel tube lies adjacent to the lower leg.

Operation

With the device in the cut-off (closed) state, the return spring causes the cut-off bar to rotate in an anti-clockwise direction and rest against the legs of the bracket. At the same time the cut-off spring forces the cut-off bar to pinch the flexible tubes that run beneath it.

To reset (open) the device, force is applied to the spring retainer plug until the cut-off bar is pushed clear of the bracket legs whereupon the return spring will rotate the spool anti-clockwise until the cut-off bar contacts the reset stop. When the reset force is released the spool will try to return to the closed state, but it cannot because the cut-off bar now rests across the ends of the bracket legs, clear of the flexible tubes.

To close the device, the cut-off bar is rotated in a clockwise direction either by a pull from the bellcrank wire or a push from the mechanic's thumb. As soon as the cut-off bar is clear of the bracket legs the cut-off spring will cause the bar to close on the tubes, cutting off fuel feed and crankcase pressure.

Fixing to the model

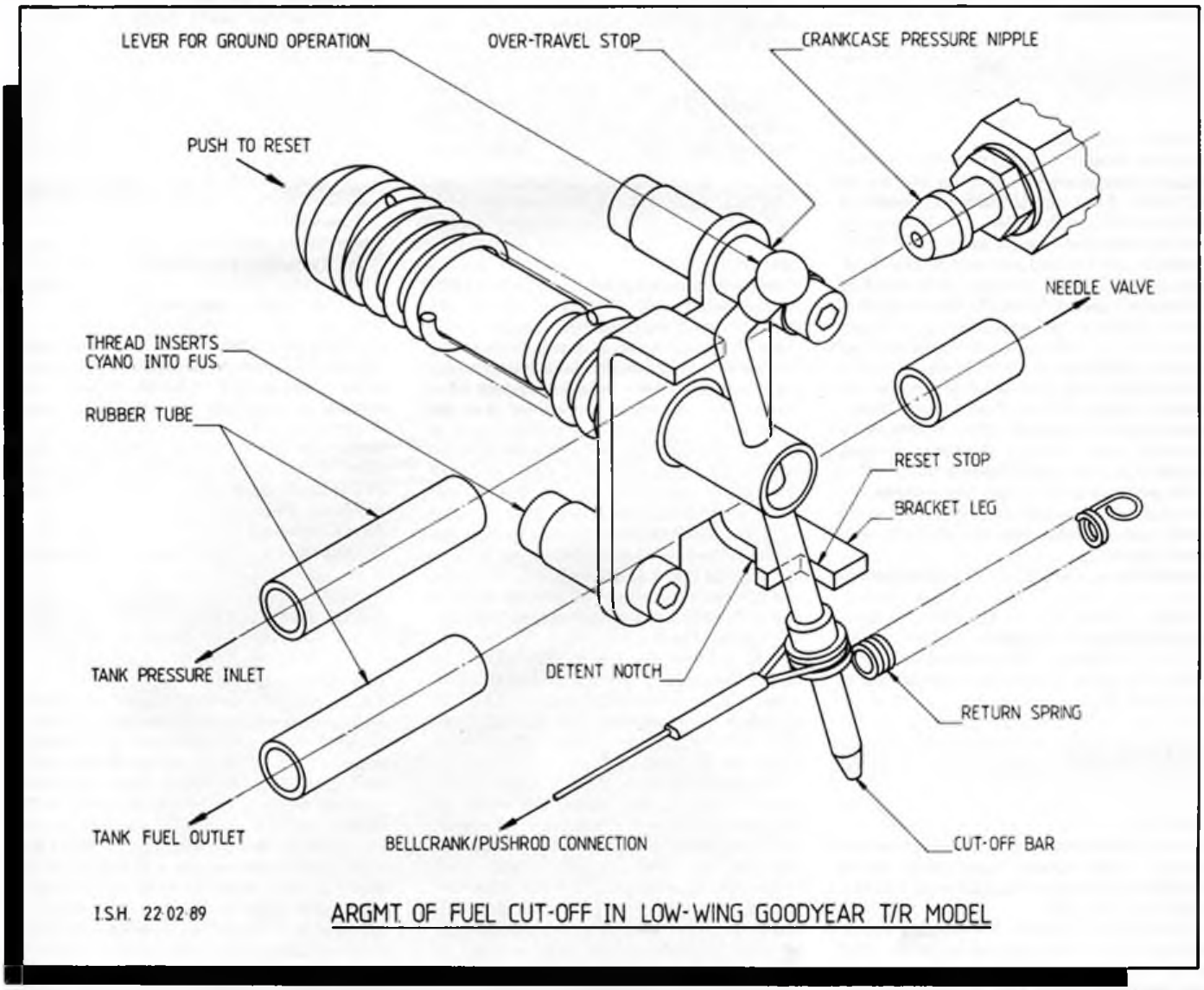
The most convenient time to fix engine mounting plates and cut-off thread inserts to a model is before fastening the wings, tail and cheek cowl to the fuselage. In this condition the fuselage is flat and easy to hold.

Attach the engine plates to the engine with screws that don't protrude underneath. Ensure that the plates are parallel to the crankcase and that the mounting area of the fuselage is flat. Degrease the underside of each plate and the mating fuselage parts. Carefully align the engine thrustline to the wing aperture making sure that there are no gaps between the plates and the fuselage. Apply a very low viscosity cyano adhesive, such as Loctite 420, to each joint line and allow to cure. Gently loosen the four engine screws and remove the engine; with luck this will leave the plates temporarily in place. Using a drill bit with the same diameter as the clearance holes in the plates, mark the centres for the woodscrew pilot holes. Drill the pilot holes with the appropriate size of bit, using a vertical drill if possible. Drive the woodscrews almost home and check that the plates have not moved. Note that the most likely cause of movement is inaccurate drilling; hence the advantage of a vertical drill. Next, select a drill bit that will fit the tapped holes in the plates and mark the centres of the engine mounting screws on the fuselage. Remove the woodscrews and using heat from a soldering iron to soften the cyano, prise off each engine plate. Drill clearance holes in the fuselage, approximately 5mm deep, where the tapped hole centres were marked. Thoroughly remove all traces of cyano from the plates and fuselage. Abrade the plates and fill the tapped holes with wax, plasticene or Blu-tack. Degrease and fix to the model with woodscrews and a slow-curing epoxy adhesive like Araldite 24 Hour. Check that the engine mounting holes are still aligned with the tapped holes and take the necessary corrective action before the adhesive cures.

Deal next with the cut-off. Mark the spool centre as required and bore an 8 mm hole through the fuselage side with a vertical drill. Degrease the rear face of the cut-off bracket and locate the assembly in the hole. After checking angular alignment, sparingly apply low-viscosity cyano to tack the bracket in place. Remove the spring and spool from the bracket and using a drill bit of the same diameter as the clearance holes in the bracket, drill two holes about 10mm deep. As before, use a soldering iron to soften the cyano and remove the bracket from the fuselage. Flood the three holes with cyano and allow to penetrate and cure without an accelerator. The adhesive will harden the wood and allow it to be drilled more accurately. Open out the centre hole to 10mm and the two fastening holes to 4mm. The thread inserts are made from 8mm lengths of 2BA aluminium studding, drilled and tapped M2 size. Use steel if aluminium is not available. Screw each insert into its hole by means of a sawn screwdriver slot or the screw/locknut technique, until it is flush with the fuselage face. The inserts will cut their own thread in soft wood but engine bearers may need help from a 2BA tap. Permanently fix with yet more low viscosity cyano. Finally, don't forget to continue the 10mm hole through the cheek cowl once the model structure is complete.

Too complicated? It might sound that way but there's no simpler way of getting it right first time. Try it - and you'll produce models that look and fly better.

Cut-off shown in open (reset) position.



READERS' LETTERS

A sportsman writes

Dear Sir,
Having read, with some disbelief, of the proposed rule change regarding towlines and non-use of winches, I must say, that having flown models in and out of contests since I was sixteen years old (I'm now a very Senior Citizen - with white hairs to prove it) I have seen, or been guilty of, very few incidents involving damage or injury as a result of careless 'winch throwing'. Counting myself an honourable sportsman I've always accepted the penalty clause for misuse of winches, which I've regarded as a justifiable law.

It seems obvious that the proposed 'law' is designed to limit still further the entry of the 'opposition' in F/F Glider at home (or 'away' abroad) to those willing (and fit enough) to engage in the doubtful art of circle towing, with the attendant gadgetry (inertia latches and so on).

For yonks now, we've had to suffer the burden of tactical gentlemen, jumping on one's pet thermal, lacking a thermal sense themselves! Still, at least the air is free - so far!
Loughton, Essex ***Rupert Harris***

Load of monarchs

Dear Sir,
Just been having a very interesting look at January's Aeromodeller. *A lovely edition. In particular, I enjoyed Alex Imric's feature on the Spencer Orion. Now that one is really going back in time. But I think that John Watters' feature on the Lutonia goes even further back! John certainly doesn't appear to be much of a 'Royalist'. Queen Mary, the Queen Mother, giving Lutonia the once over at Langley Aerodrome in 1948, the day of the Queens Cup Trophy? Never! It was of course, that the other very gracious lady, her daughter in law, the present Queen Mother, Elizabeth. I should know because I too met her there, together with her own very attractive daughter, Princess Margaret, who was only sixteen at the time!*

Sid Miller will be missed. His Lutonia was one of those classic early designs with a superb finish that attracted nothing but envy - and appreciation!
Southbourne, Dorset ***Phil Smith***

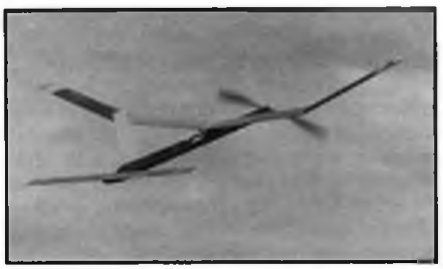
(Thanks to Phil and all the other readers, including Pamela Urquhart, daughter of the late H.J. Towner, for pointing out this monarchic error. We await the summons to the Tower. GC).

Alarm call

Dear Sir,
In free flight contests early and late in the season fly-offs, when needed, tend to occur in conditions of deteriorating light and visibility at the end of the day.

Would it not, therefore, be reasonable to hold a fly-off early in the morning before *the start of the main contest? Entry would be optional and the result would only be used to decide the winner if more than one 'full house' were obtained afterwards.*

To encourage participation in such a pre-contest fly-off, an award might be made for the longest flight, irrespective of whether or not it was needed to decide the result of the main contest. This would be after the style of the American early morning, one-flight Mulvihill Contest.



An Open Rubber flyoff model wings its way into evening skies - a future early-morning sight?

In making this suggestion I have Open Rubber particularly in mind but such a scheme might also be applied to other Open events - and indeed to FAI classes. To minimise luck on the tactical element I would also suggest that all of the fly-off flights be started within a period of five minutes. Benefits should include fewer lost models, thanks to better light and less air movement in the early morning. I claim no originality for this idea which has apparently been put forward on other occasions by others.
Totland Bay, IoW ***John White***

Beautiful brews

Dear Sir,
Reading about mixing fuels in December 1988 Aeromodeller's *Mind The Lines set me thinking about lubricants for diesels and a cheap oil that I never as much as once saw mentioned in all the articles on fuel in the model press over the years - veterinary castor oil. I assume this stuff to be less refined than the medicinal form. In any case it didn't seem to have any bad materials in it that might damage engines, for I used it for years and I still have some of the engines to this day (how I wish I had all of them!) which are in pretty good nick. The stuff had several advantages over the medicinal version: you could buy it (in the part of the world I then lived in, during the 1950s and 60s) in rural pubs and grocery shops; it was a heck of a lot cheaper than what the town chemist had to offer; it came in big amounts, that is, big bottles... even if they were a bit bizarre: the bottles had really long necks, about a foot long if I remember rightly. This was to drench cows and other animals. All I can say my is Bees, Javelins, Frogs, Elfins and so on ran the finest on it.*

An interesting aspect was the colour: golden brown. When this was mixed with a deep sea green paraffin then available (three in one job, equal amounts of ether, paraffin and castor was the recipe), the result could only be described as artistically beautiful. Moreover, this was very often filled out into what for the lack of any other term of reference might now be called 'Ray Malmstrom' tanks: blocked off toothbrush containers, i.e., transparent. One could admire one's own fuel!

One day a publican in West Ireland said to me, no doubt having noted I was a very good customer for castor oil: 'I can get you the heavy stuff if you want. Zoos.' I said I was happy with what I was getting. He asked what I was using it for. After some explanation he pulled a face: 'I see. Always thought it was for a reformatory.'

The above left me wondering what they dosed giraffes with. Anyway, with the passage of time I went to live in cities. And that was the end of the grocery shop lubricant. Out of my life - that nice source was gone. When the price of oil rose after the early seventies. I turned to using single-shot car oil (non multigrade), grade 50. In about 1976 when I had laid in several tins of it - one had to go to a garage that specialised in selling a wide range of oils to get it - I read that such oil was not really the best after all. At least that was the meaning I took. Goodness! I said to myself; I remember reading in Model Aircraft in a rather authoritive mixing fuels article in a 1953 issue and again in a 1958 issue that this one-grade was fine, and could also be used in petrol engines, although perhaps a higher number might be better, say grade 60 or 70 (I do hope any memory is serving me right in all this!). I wish someone would clarify the situation. Anyway, no matter what, be this latter oil be good or bad, it sure hasn't the nice colour of the castor: it makes for a sort of muddy looking brew when the parts are mixed. But then does it matter? One of the advantages diesels had over glows is no more. The stuff of those little plastic tanks is gone too.
Amsterdam ***Peter Shenter***

More effort needed?

Dear Sir,
I notice a plea for our youth to partake in the 'Junior FAI' contest in future. Introduction of the young to F1C is hardly helped by the removal of one of the two 'grass roots' level, decentralised F1C contests! It is here that I suggest the initial baptism of fire would take place. With only one decentralised contest left, F1C is hardly worth the effort in a Rossi motor and Seelig timer...
East Grinstead,
W. Sussex. ***Harry Hutchings***

The old story

Dear Sir,
Thank you for re-uniting me with my lost Ace of Diamonds rubber model recently. I seem to be breeding flyaway models at the moment. Recently I flew a Suzy's Too from the Impington MFC ground at Oakington. I gave up timing after ten minutes, and resigned myself to the thought that I'd lost it (but was very pleased with its performance). Later that evening I had a phone call from someone who had found the model at 4pm, some six miles away. It pays to put your name and address on; and yes, it did have a D/T, but no, it wasn't lit before the flight. How often have we heard that and still we don't learn...
Impington, Cambs ***Roy Julian***

Astral planes

Dear Sir,
Your Vintage and Scale section in the September issue brought back a flood of memories concerning Astral kits. In the mid-war years I struggled with an all-obechi Beaufighter. My fingers still bear the scars of attempting to cut this rock hard wood with a razor blade. I eventually succeeded in cutting out formers by fretsaw... In the summer of 1944 I spent my holiday near Leeds, and almost by chance, found myself one day outside the Astral premises at Dixon Mills. With the cheek that only a ten-year-old boy possesses, I knocked on the door and asked if I could look around. They treated me very kindly and gave me a conducted tour. Most of the few staff were ladies, busily assembling the dreaded obeche kits, but others were breaking up fifty or sixty tea chests. These had been purchased from a local removal firm; it had been discovered that, although the panelling was the normal thin hardwood sheeting, the framework was balsa! Thus random lengths of tatty balsa wood were being recycled and machined into strips and sheet for the small Ace series of kits.

Rubber was also a wartime problem, and Astral attempted to overcome this shortage in two ways. They purchased large quantities of a weird synthetic substitute - almost white in colour. In its unprepared state it had no elasticity at all. However, after boiling for twenty minutes, your 1/4in flat could just about turn a propellor; and a recipe to this effect was included in the kit! The alternative was a type of shirring elastic, without the cotton covering. This was reasonably effective, but the number of strands or loops involved was phenomenal - something like three hundred to power a 28in model.

To be honest, I don't think the firm really believed that an obechi multi would ever fly. These were really non-flying display models, and even the balsa versions were hardly an improvement. As gliders they just about worked; I recollect a very effective slope soaring Hampden. That said, the single engine Ace and Cadet series were quite reasonable, albeit woefully inaccurate in some instances.

Some time after my Astral visit I was given a stack of Flying Aces magazines and I still have forty or so. My first successful multi was flown from one of these; Struck's NC4 flying boat, a three-foot monster. Flying Aces also published a Curtiss A18 twin, and a large number of 'single' scale plans, including a very impressive Fokker D21 by Herb Weiss.

I later went on, with the advent of the diesel, to what seemed a more practical form of flying scale, and my FE8 and Sopwith Triplane were published by your magazine in the early 1950s.

Happy Days!

Devizes, Wilts ***Wg. Cmdr VD King OBE RAF***

Laminar logic

Dear Sir,
I write belatedly to comment on John Bunting's letter in the December Aeromodeller, *about the articles once published by Payne, Walker, Annenberg and others, and the work of the* Low Speed Aerodynamics Research Association. *Like John B, I was an avid but impoverished schoolboy reader in those days, joined the LSARA as a very junior associate member, and did plough through most of the material, though not always with sufficient understanding.*

As to whether more is known now about low speed aerodynamics, the answer is yes, but perhaps not a great deal. Much of the LSARA work was based on standard full-size sub-sonic aeronautical practice, and most of this, especially with respect to stability, remains pretty well as it was. We do have to remember, however, that airflow at very low speeds and sizes of wing (low Reynolds numbers) tends to separate more easily and this upsets the standard equations, especially for very small models like chuck gliders, indoor and 'peanut' types.

On wing sections, and Payne's reference to the N-60 profile, he was here relying mostly on F.W. Schmitz's wind tunnel model tests, done at Cologne in the late 1930s but not available in Britain until after 1945. Schmitz has been well supported by later work and there are now a good many more, and better, wind tunnel results to consider. The thin highly cambered wings, with turbulators, used on many free-flight models, reflect Schmitz's discoveries more than some model fliers realise. The former champion model flier, Rudi Lindner, was at the forefront of this development.

What has developed a great deal since those days is boundary layer theory in which 'separation bubbles' figure importantly at low speeds. There is now an enormous literature about this which the LSARA could not have used. For this reason, their early attempts to design 'laminar flow' profiles for free-flight models were not likely to succeed. Quite apart from the difficulty of building the wings accurately enough (which is still a major problem), the LDC sections were no more efficient than the 'old fashioned' profiles such as Clark Y and RAF 32 they were intended to supplant. (I did try them!)

More recently still, highly sophisticated methods of designing wing profiles have been worked out, with the late F.X. Wortmann and the very much alive Richard Eppler among the many who have contributed to this. There are highly developed 'panel methods', requiring main frame computers, which have proved extremely useful for designing low drag wings for full-sized sailplanes and aeroplanes right up to the NASA Shuttles.

Despite all this, the mathematical models tend to break down severely as the wings get smaller and the flight speeds get lower. Eppler has been heard to say he would like to make the Reynolds numbers of model aircraft illegal, because as I think he admits, the theories still have not been developed to cope.

There is progress. Conferences take place and academic articles are published. Some of them are mentioned in the second edition of my own book Model Aircraft Aerodynamics, *which has hardly any maths in it, but, I hope, explains matters in a non-technical way. But while professional aerodynamicists remain preoccupied with missiles, space shuttles and Hotols, it is not likely that very much advance will be made at our end of the flying spectrum. And don't forget the bumble bee!*

I expect everyone will be glad to hear it is not necessary to have a mathematical degree or a Cray computer in order to understand how model wings work. (I am no mathematician!) Model flyers know as much as anyone else about this, in practical terms. At the same time, we ourselves have changed. Except for dedicated free flight contest modellers and indoor flying enthusiasts, we are almost all operating bigger, faster, radio controlled aeroplanes and gliders now, and these, while still in the low Reynolds number regime, are very much closer to the full-sized theoretical predictions.

I hope Messrs Payne, Walker, Annenberg et al, do still fly models, and read Aeromodeller. *Perhaps they will respond to this correspondence?*

Stepney, South Australia ***Martin Simons***

Back in 1952, Vic King prepares his FE8 (see Astral Planes). Fancy the challenge? Quote plan no. FSP 495. Price is £4.85 including postage. Ideal for point-eight diesels!

FREE FLIGHT SCENE

Dave Hipperson scans the competition horizon and retrieves matters of moment

John Cuthbert's foam Supernova kit

Supernova doesn't pretend to be a top contest-winning design, although it is very much of that layout. It would, however, make an excellent first glider for anyone – including those experienced modellers who would like to dabble in the class. With proportions and sizes not dissimilar to the classic Keil Kraft Caprice it is constructed along latest lines, using extensively pre-shaped foam sections with the very minimum of wood reinforcing, and virtually no ribs at all. With the kit comes a very complete instruction book not only on how to build the models – there's four pages on that alone – but also with considerable information on trimming. John even has videos available for hire, further to explain building and flying techniques.

The glider is available from Jay Cee Aerokits at 7 St. David's Crescent, Bottesford, Scunthorpe, South Humberside. John's firm also will supply glass and foam products of various types. This includes foam wing blanks cut to size, section and with desired warps. Details and price on application.

An *Aeromodeller* kit review of this model is due soon. John reckons he can build one in three hours flat. Could you?

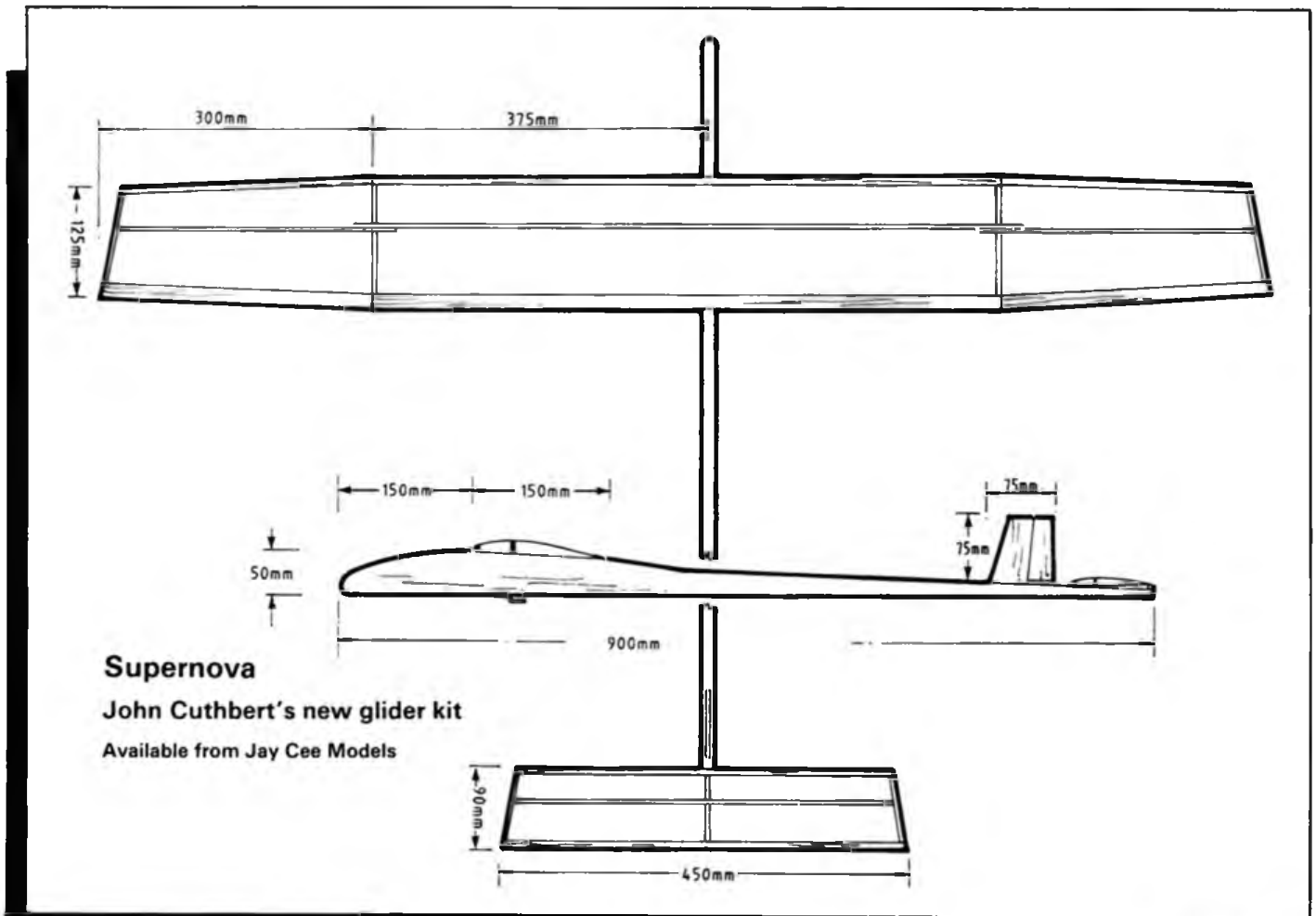
Builder of the Model rule

It would appear that some of the ramifications from a possible change in the Builder of the Model Rule (BOM) have seeped through into less contest-orientated spheres of aeromodelling, if Cyano de Bergerac's pronouncements in the March issue are anything to go by. He reflects that the SMAE are not about to throw the rule away. Well that's true for '89, but the writing is on the wall for the future.

Perhaps it is lucky, at this critical moment in aeromodelling history, that those empowered to make rule change suggestions to Council are better than usually qualified. Judging by the debate, not only on this subject but, co-incidentally, on a parallel one regarding how best we should pick a team by this year's FFTC, you can rest assured that when a suggestion is made it is sure to be a well-considered one.

After its original inception by the FAI for international meetings the sharp end of the wedge that could eventually form an across-the-board lifting of the BOM rule here in the UK would appear to be its logical removal for team selection. Then it might soon be lifted for all FAI events 'as a logical step'; from there it is merely a stroke of the pen away from being lifted for all SMAE free flight classes as a matter of rationalisation. Think of past legislation that has been introduced under similar guise – the seven-second engine run rule for 1/2A; then, Open Power, being a classic example. That's the probable sequence of events; the time scale is much less easy to predict.

Of course, the FAI premise that the rule should be lifted 'because it was becoming impossible to enforce' was rooted in poor logic in the first place. This is rather like suggesting that we make murder legal because murderers are so difficult to catch! Nevertheless, it's done; and I fear it will never be reversed. Believe me, this change – so easy



to make on paper - is a dangerous one-way ticket unless all the ramifications are carefully addressed. Kit models have always been allowed in competitions. Personally, I would not object to anyone flying a kit model, even a custom-made one that had required the very minimum of construction on the builder's part. Just what constitutes a kit and just who is responsible for the majority of the building effort is actually not the issue that is likely to have the most effect on the contest scene. The line to draw is not between whether you built the model or not, but between whether it is *your* model (however much, or little, of a hand in it you had at the construction stage) or whether it's someone else's.

I cannot see why, for example, a model almost entirely built by modellers other than the flyer cannot still qualify as a kit and be legal under the current rules. By dropping the rule simply to encompass such cases we stand the risk of opening Pandora's box of problems when trying to formulate a practical way of verifying who then *owns* which model, thence to preclude swopping and borrowing at crucial moments during a contest.

In short - who owns the model, and when did the ownership start, become the criteria.

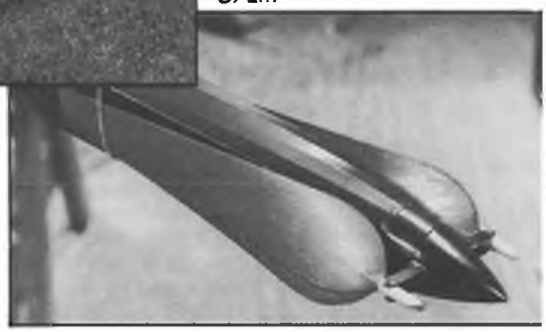
For FAI International events such as World and Euro Champs this isn't a problem. Before the start of an event all eligible models are processed, counted, identified and labelled, so they can easily be verified as being one competitor's property.

In our domestic scene, covering yearly so many events, there is really no way of checking what model a contestant is flying. It is fairly obvious if he flies a third model when only two are allowed, but it's not so easy to tell if, say, that second model he is flying is one he came with - or did he borrow it a moment ago? Borrowing models on the day will change completely the spirit of free flight events far more than the almost technical issue of actually who built what.

Competitors who drop flights will be able to enlist the help of clubmates effectively to re-enter with another of their models - and this can go on until all the models, or helpers, are exhausted! Further, when the flyoff comes, contestants who have used only one model could have their pick, not only of their own models, but those belonging to anyone else who may have dropped a flight but still wants a share of the flyoff action...

Ownership will have to be easily verifiable. I don't believe that SMAE numbers on the wing will be enough. Two or more sets of numbers on the same model could quite easily circumvent that one. No - as with all rule changes, the ways this one can be implemented and enforced will need considerable investigation if it isn't to change our hobby out of all recognition. Hopefully it will be these issues that are addressed in detail by the FFTC before any conclusions are reached.

That having been said, the real input should be coming from *you*. In the recent past some decisions made regarding the contest calendar and rules have not met with anything like majority approval. Not because of underhandedness but simply because the majority stayed silent when its voice was needed to be heard. I hope this won't happen here. The Editor's request for comment on the subject last year hardly inspired a sackful of correspondence. Whichever way you think - don't let this one go by without having your say - loudly. Your hobby could be ruined before you know it.



Left: Transatlantic tale - Dave Platt proudly holds Alien, his own-design Class D power job. Rossi 60 provides the urge. Look at that flying field! Below: More of Dave's work - the businesslike nose end of Early Bird 400, his Open Rubber design for the Dawn Unlimited class. Latterly famous for R/C scale wonders, Dave hasn't touched the transmitter since re-discovering F/F and C/L...

Trials and Team selection

Following the threatened abolition of the 'Builder of the Model rule' for team selection events the FFTC are also looking seriously at restructuring the Trials system. Once again your input would be welcome, although this is not quite as crucial an issue because whatever changes might be made to our Trials they are hardly likely to be final or irreversible. Nevertheless, there is growing concern that with venues for Free Flight now limited in availability and quantity we should somehow spread our team selection over a longer period to iron out some of the 'luck' element inseparable from having to use small turbulent sites.

So far, FFTC discussion has ranged over the whole spectrum of team selection possibilities from, on the one hand, a purely selected team drawn up taking into account past performances and current form, to the present system - and even further on to a selection procedure that might embrace some events held abroad.

I would expect arguments to polarise around a Trials format of perhaps five or six SMAE events from which the individual may take, say, his best three performances scored with the either the Plugge or World Cup formula. Of course, at the moment, changes are being investigated to create a more workable system for administration as well as taking some of the pressure off individual CDs at Trials meetings. As yet, no one has suggested a way of picking a *better* team. By that I don't mean a change of fliers. After all, whatever selection system we employ, we only have the same material as before from which to select. An interesting suggestion might be to introduce an element that at the same time as easing administration and venue problems would also improve the material from which we are selecting. Perhaps, in addition to a 'best three from five' system we could allow contestants freedom to use points scored in any World Cup event to replace any of their three chosen domestic contests. Of course, our scoring system would have to be similar - that is, down to 14th place, no matter how many fly. Points in European World Cup events are considerably harder to earn than domestic ones - there are more entrants and, dare I say, a high standard - however, it would allow competitors more freedom to choose where they fly and at the same time would automatically give them invaluable experience in conditions much more similar to those likely to be encountered at a World and Euro Champs.

A Radio flyer returns

Such is the way of things the world over that many R/C flyers are returning to Free Flight, notwithstanding the reduced number of fields available nowadays. However, we get particularly excited - at least, I do - when we learn of such a renowned modeller as Dave Platt once again taking it up. Perhaps this item should come in World News! I heard from Dave recently; he explained that he has been building, flying and competing in Free Flight events around the Florida area for the last three years - ever since he discovered a huge local field. The photographs here show that he means business. The prop assembly belongs to his fully-tapered 400sq in Open Rubber model used in a class they call 'Dawn Unlimited'. That says it all. The power model is Class D - the biggest AMA category. That's a Rossi 60 up front. A monster by any standards - no wonder it's called Alien!

For those who might not remember him, Dave was a F/F and C/L modeller in the UK through the 50s and 60s. He designed many successful duration and sports models; the Keilkraft Halo springs to mind immediately. As radio became reliable in operation he

turned to that, working much of the time as a professional model builder for many kit manufacturers in the UK, and at the same time winning R/C Scale at the Nationals on numerous occasions with the first of the 'super scale' efforts we had seen. A little later he went to America and started his own model business, which he still runs. During the early 60s Dave and I were next-door neighbours. He taught me how to build - and build fast. Now we learn that in the past three years Dave has built a hundred F/F models of various types and sizes! Oh - his local site? He discovered it after a chance conversation with an R/C glider flyer. It's a 'turf farm'. That is to say, the crop is turf for lawns and parks rather than the long grass for animal feed. Hence a billiard table surface, mown to cricket pitch outfield length, always kept from drying-out by irrigation ditches. Wait for it - the measurements are two miles by four miles. Eat your hearts out!

Lightweight motor tube construction with glass fibre

Modern F1Bs and some Coupe d'Hiver models carry more timer gadgetry than was common ten years ago. Despite the miracle Tomy motor, which makes almost anything possible, the weight of the associated systems still creeps up. With today's fashion towards longer, thinner wings a good deal of weight still has to be reserved for strengthening this component, even despite the improved materials available. The super high-aspect ratio solid-wood-wings models are the ultimate example. Here the fuselage has to be kept absolutely as light as possible.

During the past few years I have experimented with various construction methods for F1B model motor tubes. Long ago I would laminate them from two thicknesses of medium 1/16in sheet - usually glued together with PVA. These were rather heavy, slow to build and tended to go brittle with age - certainly after a few years. They also offered no protection on the inside from the ingress of rubber lube. Since then I have used similar techniques but with laminations of 1/32in balsa interleaved with glass fibre and resin between the layers (and on the outside). The most fiddly and time-consuming system of all was tried recently when I made a couple from 3/32in soft sheet and resin, and glassed the interior and exterior. Very strong but rather heavy. I have now established a system that produces a light and strong motor tube very quickly. It's a combination, or variation, of ideas - not the least, Peter Gaunt's.

The balsa is simply a four-inch sheet 20in long. The width of the sheet can be adjusted accordingly if a different diameter is sought. The formula is: Diameter = Sheet width/ 3.142). A four-inch sheet gives a diameter of a little over 1.25in (see Fig. A).

The wood should be of straight grain, with the density as constant as possible across it. If it is heavy at one end then that must be the nose. I usually cut from a sheet of 36 x 4in, weighing 16-18 grams.

The blank is soaked for a few minutes in hot water and then bound to a suitable size tube or rod (fig B). If you haven't got a winding tube of approximately the right diameter, a smaller one can be wrapped with paper to increase its size, although it's a good idea finally to cover with polythene so the paper doesn't go soggy and soft when it comes under pressure from the wet balsa! I use a 1.3in OD aluminium tube - the same as I use for winding my big Open Rubber models. If you want perfection, Joe Maxwell will make you one of any size.

Fig A

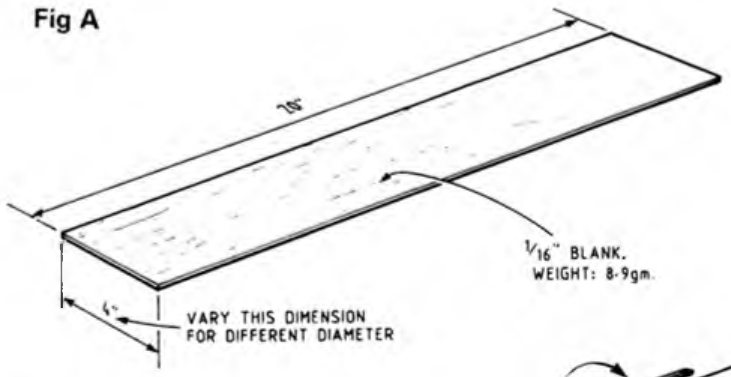


Fig B

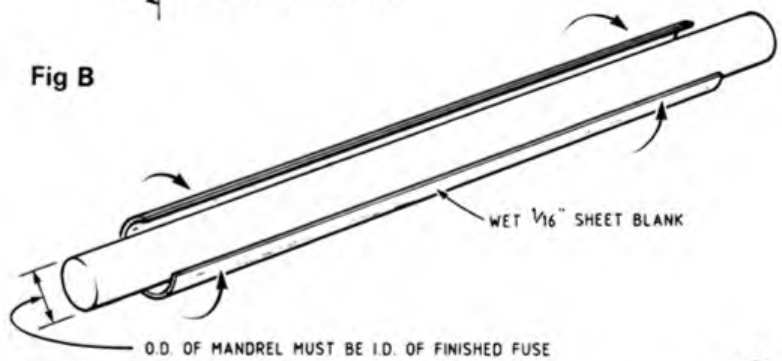
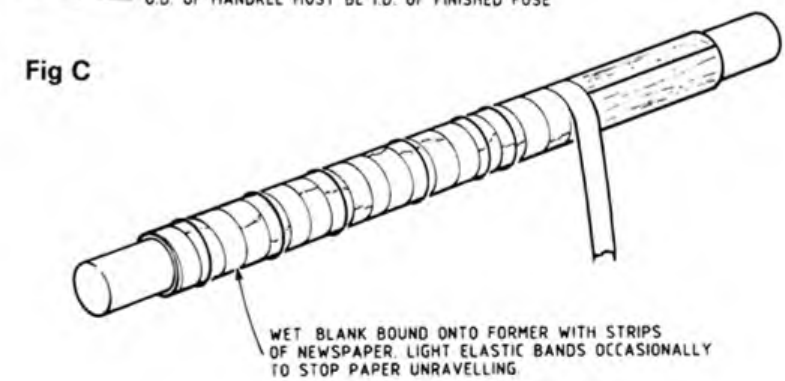


Fig C



Bind the wet blank to the tube with strips of newspaper. These spread the load and also absorb a little of the water. The unit should be dry and ready to remove overnight if left in a warm room (Fig C). While it's cooking you can decide what fittings you want at the nose end. You may wish to use a commercial aluminium ring. If so, this will determine your fuselage diameter. Also, decide whether the rear boom is to be detachable or not. Mine are, but they weigh more and confer little advantage apart from ease of storage, and convenience in repairs. If you are tight on weight, my advice would be a one-piece fuselage. What is more, that joint has to be very accurate, otherwise you may have trim change problems.

When the blank is dry it can be removed from the former and the seam glued with cyano (Fig D). You now should have a dry, uncovered balsa tube weighing under ten grams. If you have selected the wood from even-grained stock the circular section will be perfect. It is more likely not perfect because of hard patches in the wood. The answer is to cut at least one, if not two, outside formers from sheet; namely, simple holes in 1/4in sheet balsa, exactly the outside diameter of your finished tube. These can be slipped on (it's best they are a nice snug fit). Do not block the ends yet, but some slight reinforcement is OK - at the front for preference. Remember to incorporate the slight side and/ or down thrust at this stage. The top and bottom of the tube will thus have to be marked.

With the front reinforcement in place and the formers slipped over the outside of your tube it should be a regular round section all the way along. And, of course, it won't roll off the bench while you are working on it! (Fig E). Now make a plunger from a piece of 1mm ply cut to a close fit inside the fuselage and mount this on a hard piece of 1/4in sq balsa long enough to reach down the full length. Close one end of the tube with a plastic bag - preferably, the end you have already reinforced. This bag should be tight up against the end of the tube.

Mix 15cc of SP 113 slow-curing epoxy, or similar material. This can be warmed under a lamp and thinned enough for the next step, but remember not to overcook the resin as it will start to cure too quickly. At room temperature it takes six hours. When warm and thin, the resin is poured down the fuselage a little at a time and worked up and down with the plunger (Fig G). This acts as a spreader and an impregnator. You will find that having bagged the end you will make little mess, and save resin. Of course, there will be quite a build-up at the bagged end. By the time you have used all of the resin you should have covered all the inside of the tube. Hold it up to the light and see if it's shiny (be careful not get an eyeful of resin!).

Fig D

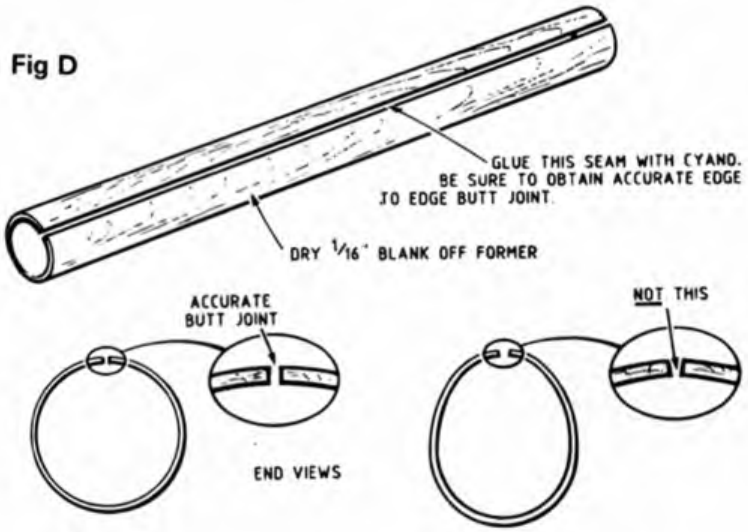


Fig E

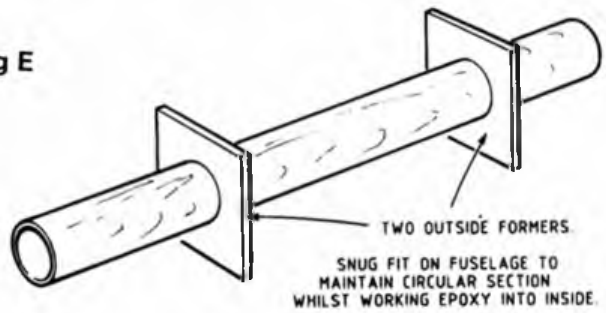


Fig F

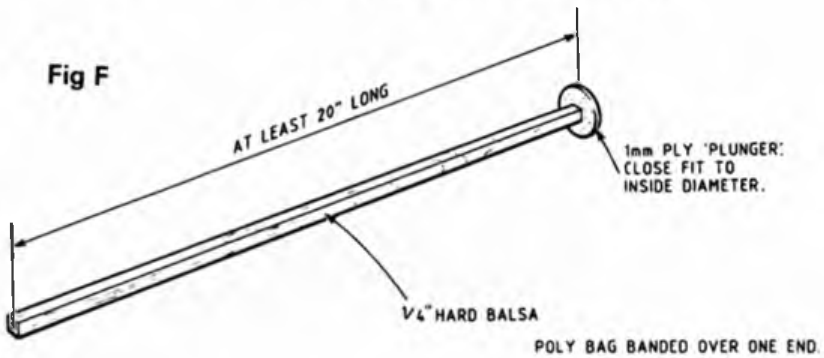
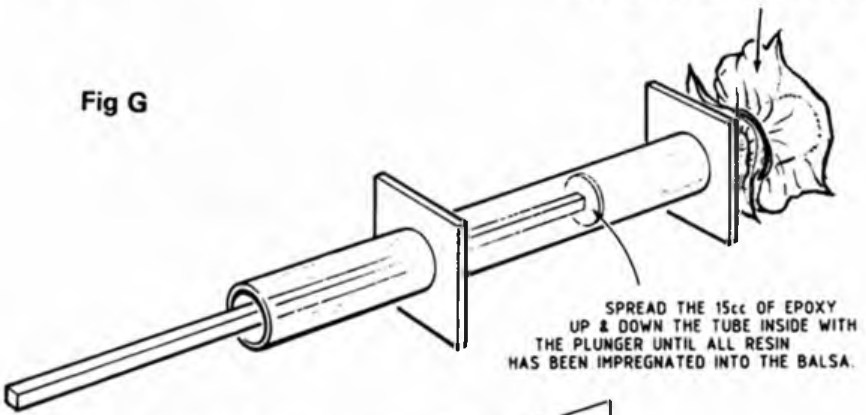


Fig G



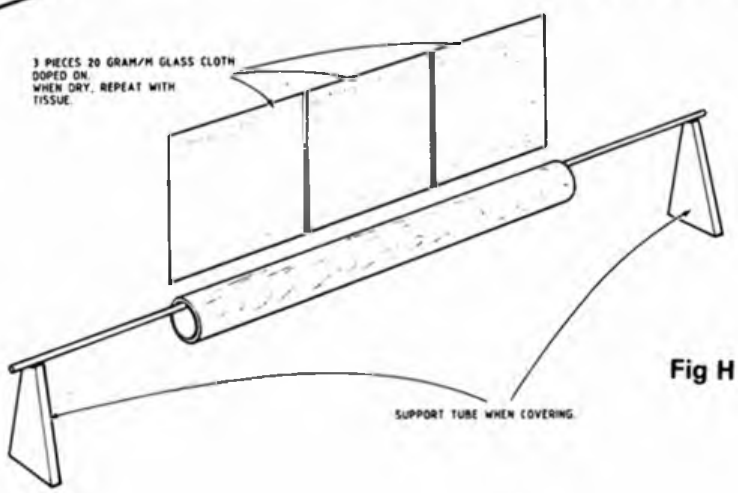


Fig H

Now remove the bag and wipe out the resin that has accumulated, or pull it down the tube with a plunger if you still see dry patches. By limiting yourself to 15cc of resin you will ensure that the weight doesn't skyrocket. You may need a little practice at this. It isn't a bad idea to make two or three tubes at a time - this also saves wasting resin.

The fuselage is best left nose-down to dry so that the resin will tend to run towards the nose, rather than form a 'bilge' along the tube. If so, ensure that it is wiped clear of the nose former after three hours into the drying time (before it has set). The resin will have increased the weight by six or seven grams. When completely dry and hard, in twelve hours, you will be amazed at how stiff the tube has become. The outside formers will have kept the section perfectly round and when the ends have been finished as desired, the formers can be slid off and the tube sanded smooth. There are sure to be some slight identations from the binding when wet, and maybe even a little resin will have soaked through. The outside of the tube can now be covered with 20 grams per metre glass cloth, doped on, not applied with resin (Fig H). To ensure that this is a simple job and the glass goes on flat the fuselage should be supported on a horizontal rod so that it can be revolved freely and not touch the bench. The glass should be applied in three sections. (If you can apply one piece of the stuff, twenty inches long, perfectly flat then you are indeed more skilled than I). Dope the glass on with 50/50 dope/thinners with the seams at the bottom of the tube. This glass will increase the weight by another three or so grams, and when dry will further improve the stiffness. The glass may bubble up slightly as the dope dries. If so, it's worth applying another thin coat, easing the bubbles down before eventually sanding and finishing when dry.

I finish with a covering of Jap tissue, once again doped on in sections, with their seams arranged to run along the bottom of the tube. Jap or even Modelspan covering will increase the weight by another two or three grams.

The finished product, twenty inches long, should weigh 23-25 grams even if you have been liberal with the resin and dope. With practice they can be made even lighter. This compares favourably with most commercial units, but there's an added advantage that you can make them the exact diameter you require. The epoxy SP 113 is available from Mike Woodhouse (13 Marston Lane, Norwich, Norfolk) and all large model shops. A similar product is available from John Cuthbert (address as for Supernova description); and since the piece about glass-fibre covering props a few months ago I have been advised by Ralph Sparrow - a very well informed Radio glider flyer - that Araldite LY/HY 1927 is comparable; it thins readily in meths.

Mini Vintage

Although not an official event - it's still very much an SMAE experiment - Mini Vintage will be run alongside the conventional classes at this year's SMAE Summer Mini Event scheduled for 9th July, probably at North Luffenham. For those interested in the class - and a good entry will be needed if the class is to stand a chance of official adoption next year - the rules are as follows:

As per existing SMAE Vintage rules in all details apart from:

a) Rubber models: flat span not to exceed 34in.
b) Gliders: as per full size Vintage
c) Power models: as for full size Vintage, but excluding rule 3.17.4 (j). Models must be powered by 0.76cc or smaller diesels. Engine run to be 20 secs maximum whether a vintage or modern motor is used.
d) Mini Vintage is a combined event. The max shall be two minutes, but subject to the adjustments possible under rule 3.1.4.1.

It should be stressed that these are *initial* rules. If loopholes appear on the first try out then we will be able to close them. Prizes at this event will include Fletcher D/T timers.

What's Happening SMAE Free Flight

23rd April	**SMAE Spring Mini/Vintage meeting** A/1, CDH, 1/2A, Power, HLG, Vintage, Slow Open Power. Venue: Barkston Heath Contact: Gerry Le Vey. Tel: 0904 705647.
7th May	**3rd Area Centralised Event** F1B for Weston Cup and Plugge Points; O/P for White Cup; plus O/G – no trophy.

F1C fights back...

Dear Sir

I was very disappointed to read Dave Hipperson's comments directed towards F1C flyers, in the January 1989 Aeromodeller.

I can only assume since he is a member of the Free Flight Technical Committee, and prepared to express his feelings in print, that it also reflects the Committee's views on the matter. To my knowledge there has been no comment from the Chairman. His reference to the removal of one event from the SMAE Calendar, and the threat of more to follow, I find totally unacceptable.

When Dave makes reference to competition entries, the numbers and percentages game can be deceiving. I would draw his attention to the fact that weather conditions, and the risk of losing models in crops, become primary considerations for me, particularly if I am preparing for either European/World Championships, World Cup Series, National Championships, Team Trials, and so on which all take place each year.

The average age of modellers is increasing. In the UK, with fewer two-day events and unpredictable weather, often the physical demands to get a minimum of five flights recorded during the day is a further deterrent. The Second Team Trials were a good example of flying in marginal conditions.

I also find it necessary to consider model value, together with flying risk, which in most cases is greater in F1C than F1A or F1B and, for that matter, any other class of free flight model. However, it is my choice if I fly the class.

I can say from experience that is is much easier to make a decision whether to fly or not in an Open Power or 1/2A Power competition compared to F1C.

I would not wish to defend the indefensible; there are competitors who fly, as in any class, only when it suits them, without regard to my previous comments, but this is not unusual. Nor more unusual than competitors in some classes who fly in appalling conditions against themselves.

Finally, however, I would ask that the policy makers offer encouragement and more creative thinking towards improving rather than removing competitions. It is my considered opinion that F1C in the UK is increasing in popularity, I hope the British Model Flying Association and appropriate Committee are capable of responding and nurturing the resurgence of interest, although, sadly, I doubt it!

Stourbridge ***Stafford Screen***

INTERNATIONAL WHAT'S ON

Contact SMAE at Kimberley House, Vaughan Way, Leicester (0533 518500) for details of all Championships.

World Championships

22-29th May
WORLD FREE FLIGHT CHAMPIONSHIPS
Venue: Embalse Rio Tercero, Argentina. Classes: F1A, F1B, F1C. Organiser: Federation ARgentina de Aeromodelisms, Anchorena 275, 1170 Buenos Aires, Argentina.

11-20th August
R/C SOARING WORLD CHAMPIONSHIPS
Venue: Melun-Villaroche, France. Class: F2B. Organiser Federation Francaise d'Aero-Modelisme, 52 rue Galilee, 75008 Paris, France

27th August-4th September
R/C WORLD CHAMPIONSHIPS
Venue: To be announced (USA). Classes: F3A, F3C, F3D. Organiser: AMA, 1810 Samuel Morse Drive, Reston, Virginia 22090, USA

3-11th September
SPACE MODELS WORLD CHAMPIONSHIPS
Venue: Suceava, Romania. Organiser: Federata Aeronautica Romana, Str. Vasile Conta No 16, Bucharest, Sector 1, Romania.

19-24th September
MAGNET SOARING WORLD CHAMPIONSHIPS
Venue: Nowy Targ, Poland. Class: F1E. Organiser: Aero Club of Poland, Paivel Wlodarczyz, ul. Krakowskie Przedmiescie 55, 00-071 Warszawa, Poland.

Continental Championships

23-30th July
SCALE EUROCHAMPS
Venue: Perigueux, France. Class: F4C Organiser: Federation Francaise d'Aeromodelisme, 52 rue Galilee, 75008 Paris, France.

26-31st July
CONTROL LINE EUROCHAMPS
Venue: 3 Sisters site, nr. Wigan, UK. Classes: F2A, F2B, F2C, F2D. Organiser: Richard King, c/o BMFA Open International Events

Open International Events

30th April
CRITERIUM INTERNATIONAL
Venue: Cambrai, Frames. Classes F1A, F1B, F1C. Organiser) Union Aerienne Lille, Roubaix, Tourcoing, Andre Riberolle, 155 rue Victor Hugo, 59160 Lomme, France.

2-7th May
JELLIU CUP (SPACE)
Venue: Stanke Dimitrov, Bulgaria. Classesu S3A, S4B, S6A, S7, S8E. Organiser: City Council of OSD, 2600 Stanke Dimitrov, POSO Bulgaria.

29-31st December
NZ NATIONAL CHAMPIONSHIPS
Venue: Christchurch, New Zealand. Classes F1A, F1B, F1C. Organiser: Rod Lewis, 17 Walters Road, Mt. Albert, Auckland 3, New Zealand. World Cup Event

Limited Internationals

20-25th April
BOLKAN CHAMPIONSHIPS
Venue: Sofia, Bulgaria. Classes: S3A, S4B, S5C, S7, S8E. Organiser: Ber. 48 Christo Botev bal. Sofia, Bulgaria.

5-7th May
10TH INTERNATIONAL JURA CUP
Venue: Breitenbach, Switzerland. Classes: F2A, F2B, F2C. Organiser Modellfluggrupe Breitenbach, Borer Heiner, Unt. Lebernweg 14, 4208 Nunningen, Switzerland.

13-15th May
INTERNATIONAL MAGNET SOARING EVENT
Venue: Wasserkuppe, W. Germany. Class: F1E. Organiser: Deutscher Aero Club, Bernhard Schussler, Offenbacher Str. 26, D-6052 Mulheim/Main, W. Germany. World Cup Event

10-11th June.
VOL INTERIEUR INTERNATIONAL
Venue: Orleans, France. Class: F1D Organiser: Union Aeronautique Orleans, Jacques Delcroix, 7 rue de Foncemange, 45000 Orleans, France.

16-18th June
MECSEK KUPA
Venue: Pecs, Hungary. Class: F2A, F2B, F2C, F2D. Organiser: Modell Klub Mev, Istvan Gombocz, H3-1374 Budapest, Pf614, Hungary.

24-25th June
MIDSUMMERNIGHT TROPHY
Venue: Terlet, The Netherlands. Classes: FIA, FIB, FIG, FIH. Organiser: Silent Flight, Mr. T. V. Eede, Pollux 385, 3902 TM Veenendaal, The Netherlands. World Cup Event.

30th June-2nd July
3RD CARL NEUBRONNER CUP
Venue: Rodgen, W. Germany. Classes S3A, S4B, S6A, S8E. Organiser: Deutscher Aero Club, G. Jordan, Am Leitersberg 13, D-8711 Sommerach, W. Germany.

1-2nd July
1ST CRITERIUM DE TOURAINE
Venue: Tours, France. Class: F1D Organiser: Club Aeromodelism de Touraine, 2 Place Leo Lagrange, 37300 Jone-les-Tours, France.

8-9th July
OKRO 1989
Venue: Nafels, Switzerland. Classes: F2B, F4B. Organiser: MG Glarnerland, Schneider AG, Hobby und Modellbau, Bankstr, 45, 8750 Glarus, Switzerland.

15-16th July
IGRA CUP
Venue: Brno, Czechoslovakia. Class: F1D. Organiser: Ustredni Modelarsky Klub CSSR, Opletava 29, 116 31 Praha 1, Czechoslovakia

15-16th July
SCANDINAVIAN OPEN
Venue: Revinge, Sweden. Classes: F1A, F1B, F1C. Organiser: Thomas Koster, Harlosavej 184, DK-3400 Hillerod, Sweden. World Cup Event

1st August
3rd INTERNATIONAL FREUNDSCHAFT-SCUP
Venue: Karneralm, Austria. Class: F1E. Organiser: UMSC – KOLIBRI Ober-Grafendorf, Mariazeller Strasse 3, A-3200 Ober Grafendorf, Austria.

3rd August
18th INTERNATIONAL HERI KARGL CUP
Venue: Karneralm, Austria. Class: F1E organiser: As for above meeting

5th August
18TH INTERNATIONAL KOLIBRI-POKAL
Venue: Kareralm, Austria. Class F1E Organiser As for above meeting. World Cup Event.

5th August
13th MEMORIAL IZET KURTALIC
Venue: Livno, Yugoslavia. Classes: F1A, F1B, F1C. Organiser: Aeroklub Izet, Kurtalic, Djure Pucara No 3, 71300 Viscko, Yogoslavia. World Cup Event

12-13th August
1ST OPEN INTERNATIONAL CHALLENGE
Venue: Genk, Belgium. Class: F2, F4, all categories. Organiser Limburgse Vleugels, Vliegveld plein 1, 3600 Genk, Belgium.

18-20th August
POITOU 89
Venue: Noize, France. Classes: F1A, F1B, F1C. Organiser: Aero Club Thouarsais, Jean Bassimon, 6 rue de Provence, 79100 Thouars, France. World Cup Event.

19th August
30TH SOKO CUP
Venue: Mostar, Yugoslavia. Classes: F1A, F1B, F1C. Organiser: Aero Club NH Ljubo Bresan, Kirpca No. 8, 88000 Mostar, Yugoslavia.

25-26th August
13TH INTERNATIONAL INDOOR MEETING
Venue: Flemalle, Belgium. Classes: F1D, F1D Beginners. Organiser: Petite Aviation Trixhosaures, Van Hauweart Fernand, Grand Place, 1, Bte 52, 4110 Flemalle, Belgium.

25-26th August
CHAMPIONNAT D'ISRAEL
Venue: Beer-Sheba, Israel. Classes: F1A, F1B, F1C. Organiser: Israel Aero Club, 67 Hyarkon SG, Tel Aviv 63903, Israel. World Cup Event

25-27th August
VAR KUPA
Venue: Gyula, Hungary. Classes F2A, F2C. Organiser: Modell Club Gyula, Istvan Combolz, H-1374 Budapest, Pf614, Hungary.

25-27th August
WORLD CUP INTERNATIONL
Venue: Sezimovo Usti, Czechoslovakia. Classes: F1A, F1B, F1C. Organiser: Ustredni Modelarsky Klub CSSR, Opletalova 29, 116 31 Praha 1, Czechoslovakia
World Cup Event

2-3rd September
20TH EIFEL POKAL
Venue: Zulpich, W. Germany. Classes: F1A, F1B, F1C. Organiser: LSC Zulpich, Peter Gatzweiler, Koelmstr. 52, D-5352 Zulpich, W. Germany. World Cup Event

9-10th September
MBZB CUP 89
Venue: Breitenbach, Switzerland, Class: F2B. Organiser: MBZ Basel, Gafner Martin, Rheinstr. 38, 4414 Fullinsdorf, Switzerland.

10th September
XXIII RAID INTERNAZIONALE AEROMODELLISTICO
Venue: San Marino. Classes: F3B Organiser: Federazione Aeromodellistica Sammarinese, Via Del Bando 28, Borgo Maggiore, 47031 San Marino.

15-17th September
MEMORIAL FULOP SNADOR
Venue: Domsod, Hungary. Classes: F1A, F1B, F1C. Organiser: Cavalloni Model Club, Istvan Gombocz, H-1374 Budapest, Pf614, Hungary. World Cup Event

21-24th September
MAGNET SOARING EVENT
Venue; Nowy Targ, Poland. Class: F1E. Organiser: Aero Club of Poland, Paivel Wlodarczyk, ul Krakowskie Przedmiescie 55, 00-071 Warszawa, Poland. World Cup Event.

22-24th September
NOGRAD KUPA
Venue: Salgotarjan, Hungary. Class: F2B. Organiser: Modell Klub Salgotarjan, Istvan Gombocz, H-1374, Pf 614, Hungary.

23-24th September
2ND INTERNATIONAL ISLA DE MALLORCA
Venue: Magalluf-Calvia, Spain. Classes: F2A, F2B, F2C. Organiser: Club Aermodelismo Mallorca, c/o Tomas Rullan, 64-5°-07008 Palma de Mallorca, Spain

7th October
25TH CUP OF REPUBLIC
Venue: Zagreb Lucko, Yugoslavia. Classes: F1A, F1B, F1C. Organiser: Zrakoplovni Savez Hrvatske, Dalmatinska No 12, 41000 Zagreb, Yugoslavia

14-15th October
13TH SIERRA CUP
Venue: Sacreamento, California, USA. Classes F1A, F1B, F1C, F1G, F1H, F1J. Organiser: Roger Simpson, 2625 Queenswood Drive, Rancho Cordova, California 95670. USA World Cup Event

4-5th November
INTERNATIONAL FREIFLUGWETTBE-WERTH MG BERN
Venue: Kirchenthurnen-Moos, Switzerland. Classes: F1A, F1B, F1C. Organiser: Modellfluggruppe Bern, Alfred Andrist, Blumlisalpstr. 82A, 3627 Heimberg, Switzerland. World Cup Event

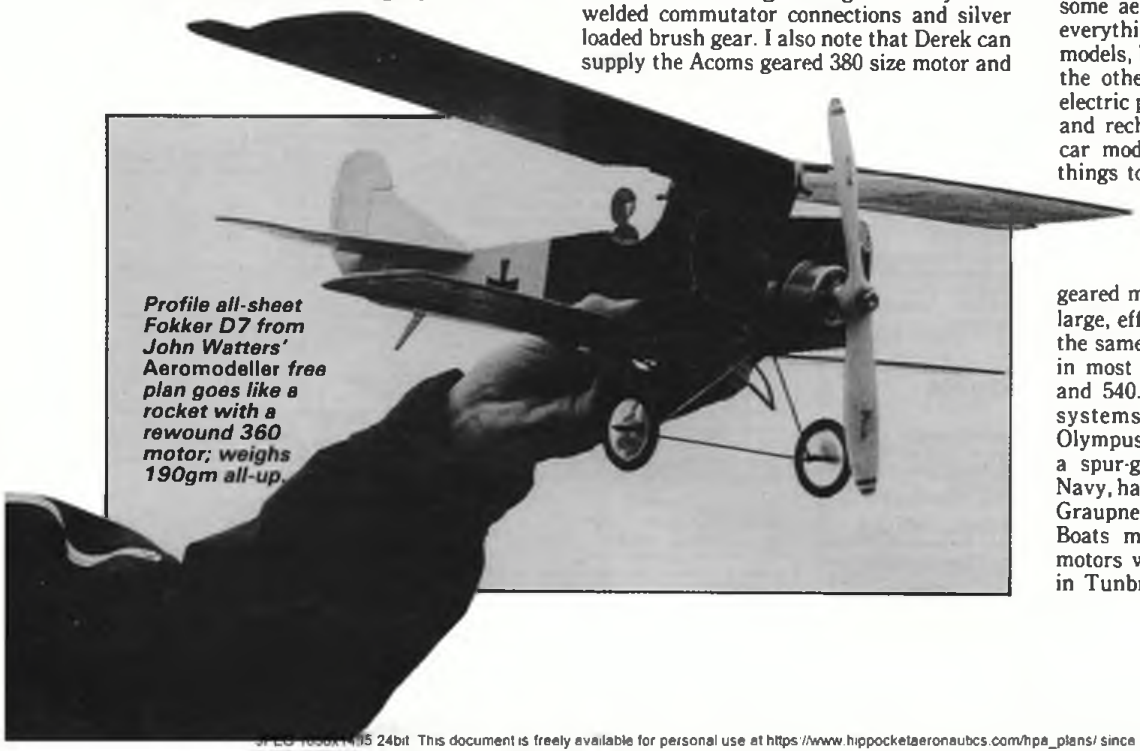
18-19th November
PATTERSON FAI CHALLENGE
Venue: Taft, California. Classes: F1A, F1B, F1C. Organiser: SCAT, Bill Hartill 7513 Sausalito Avenue, Canoga Park, California 91307 USA.

high potential

Let sparks fly with Chris Coote's guide to electric power

THERE HAS now been some feedback from this series of articles. Derek Wales of the R/C Model Centre, 214 High Street, Harlington, Middlesex is a specialist supplier of electric flight equipment to the R/C brigade, but several of the smaller items he has in stock are of use in free-flight and control-line models. Derek is the UK agent for the excellent Astro-Flight range of motors and accessories from the USA. Astro are probably regarded most highly because they have been continuously developed over a ten-year period. They are very popular in the USA, and are usually to be found in at least eight per cent of the winning models at the electric R/C Championships. Over the years the motors have been developed considerably, and are now much more powerful. This is due to the use of 'super' cobalt magnets, which are much stronger than the cheaper, more common versions using ferrite materials.

The original Astro 020 was one of my favourites. It could be used as a more-or-less direct replacement for an .049 glow motor in many of the smaller free-flight power duration kits. The current version of the 020 is now quoted by Astro as being equivalent to a good .049 like the Cox Black Widow, and is used to speed small, high performance R/C models weighing up to 24oz. However, since it only needs four cells for good performance, and since for free-flight in particular we need only limited duration, we can use much smaller cells than the 800mAh recommended. A pack of four 270mAh cells weighs in at about 60gm, and this gives a good free-flight run of about twenty-five seconds when direct-driving a 6x4 nylon prop at up to 10,000rpm. A gearbox is also available; this enables the motor to turn something like a 10x6, to haul your vintage Black Magic, or similar design, aloft. The 020 has grown in size and weight to get to this capability, and the bare motor now tips the scales at 3.5oz (95gm) compared to the 2.0oz (55gm) of the old, weaker, ferrite job. It is a much better engineering assembly with welded commutator connections and silver loaded brush gear. I also note that Derek can supply the Acoms geared 380 size motor and three different sizes of Kyosho direct drive motors, as well as the range of MFA motors and prop drivers.



Profile all-sheet Fokker D7 from John Watters' Aeromodeller free plan goes like a rocket with a rewound 360 motor; weighs 190gm all-up.

Packs vobiscum

Sources of the small sizes of nicad batteries that we wish to use are also improving. Derek Wales stocks the excellent Sanyo range, and I am informed by the UK agents that if their distributors do not have the small sizes in stock, then it is only a question of asking, after which delivery can be made in a few days. All the sizes that we use, from tiny 50mAh up to 450mAh units are normally held in stock at the warehouse so there should be little problem in obtaining them. Obviously, if enough of us ask for certain sizes then the shops will start to stock them as a matter of course. The sizes we require are often offered singly, or in packs of four, when intended for miniature R/C receiver supplies. On the other side of the country is another shop with Sanyo stock – the Abergavenny Model Centre in Wales. They also deal with electric flight and should be a useful source.

Insular electronics

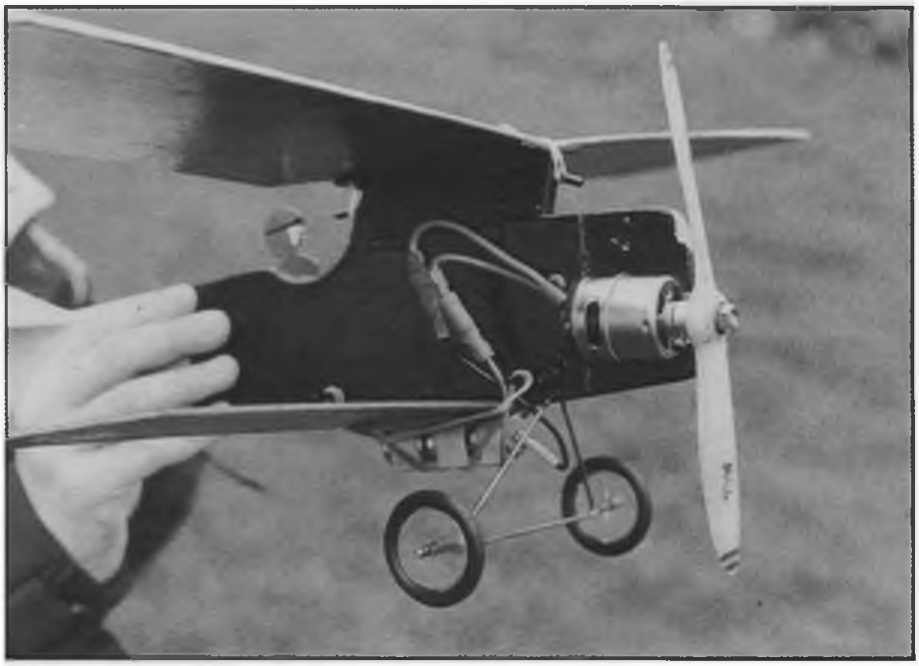
One thing that surprises me is how insular some aeromodellers are. They can tell you everything there is know about their type of models, but rarely do they look and see what the other chaps are doing. In the field of electric power, involving high energy motors and rechargeable batteries, many boat and car modellers out there are doing similar things to us with near-identical equipment. Often they have hit a problem and solved it before we are aware of it. Gearing is a case in point. In scale model boats geared motors are desirable in order to turn large, efficient, scale-like props. This is just the same problem that we find. The motors in most common use are the Mabuchi 380 and 540. The only reduction-drive aircraft systems, available from MFA, are the Olympus toothed-belt conversions. However, a spur-gear reduction 540, known as the Navy, has been available for many years from Graupner. I noted that in a recent Model Boats magazine that geared 380 and 540 motors were available from Eltham Models in Tunbridge Wells. Similarly, the massive

Tamiya range of electric car and buggy bits is most useful. I have used their cogs in my home-made gearboxes for several years. You can even buy plastic packs of varying ratios to fit the same hole centres, thus making experiments in ratio changes very easy.

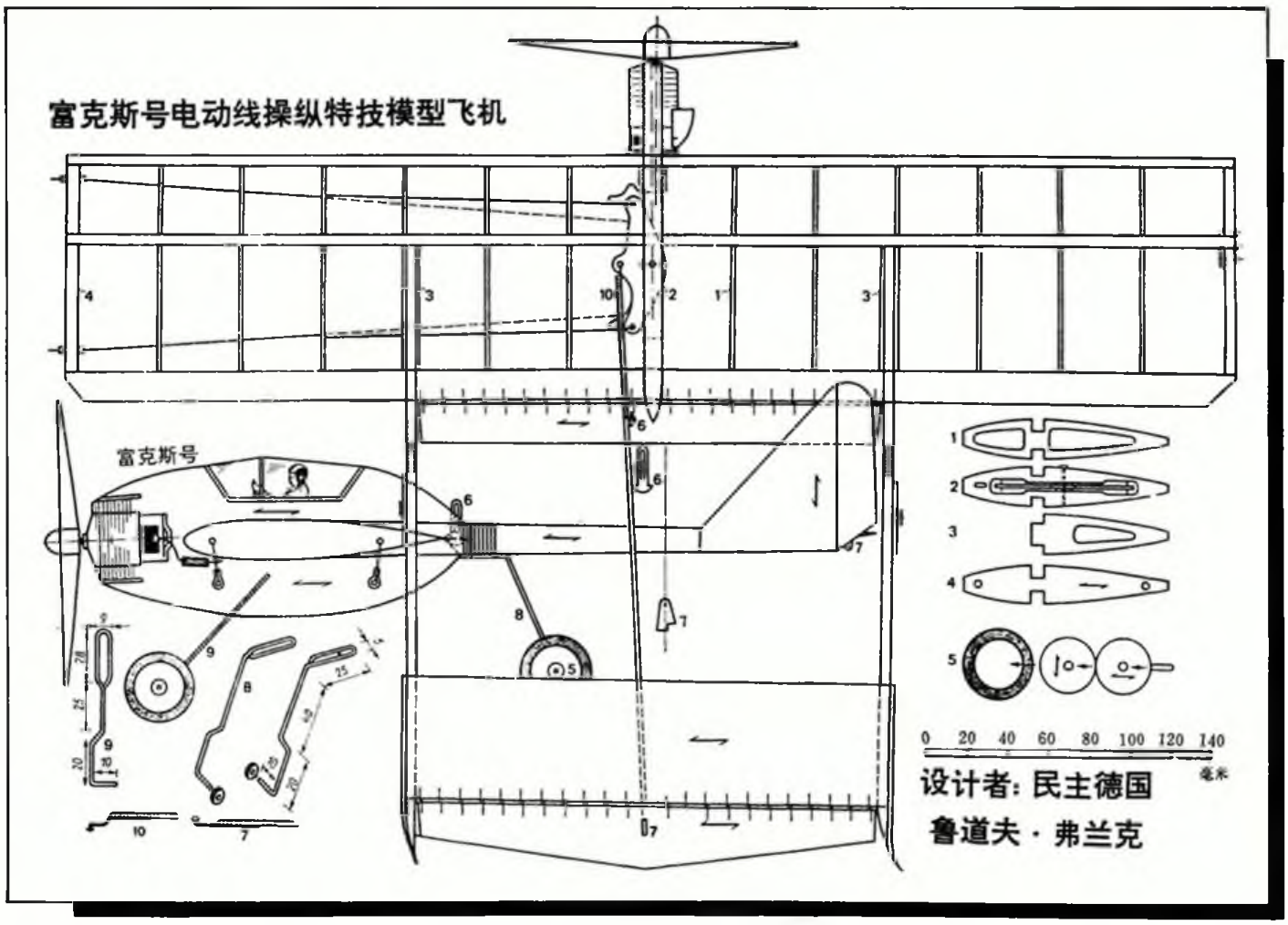
I was recently nattering to an old railway modeller mate of mine. He is also interested in vintage Scalextric model cars, which are very collectable nowadays. He gets spare bits and pieces from a specialist in Kent, who also deals in current technology stuff. The list of items is most helpful for those of you who like to experiment. Included are motors ranging from weak cheapies to ultra-tuned wild beasts that suck up forty amps or more! Perhaps most useful are all the little bits like gears and pinions, bearings (plain and ball), heatproof wire, brushes, commutators and super-strong magnets, including cobalt types such as those used in the Astro. Contact Dave Harvey whose firm is called simply '101'. The address is 2 Lovelace Close, Gillingham, Kent, ME8 9QP.

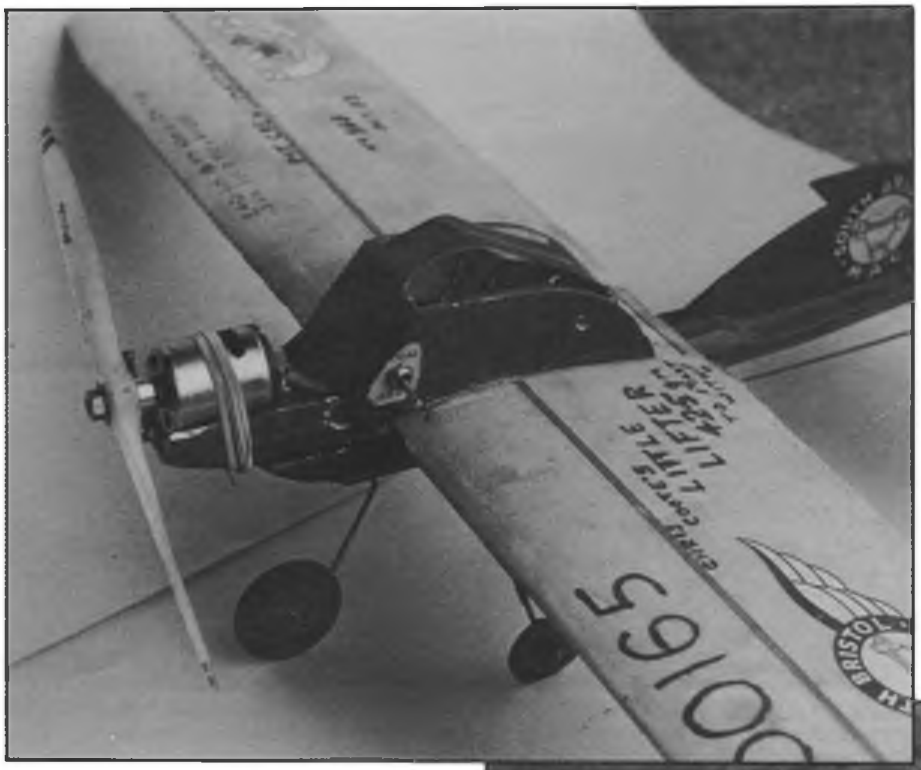
More models

Several people have discussed the use of the Knight and Pridham KP 01 unit. As I have mentioned before, this must be one of the easiest ways to go electric flying at the smaller end of the scale. Its use in indoor models has been well established by the designer, who also seems to get it to go pretty well outdoors! Most of the applications seem be in scale models. Nick Peppiatt is well known for his lovely Sopwith Tabloid biplane that used to fly so well indoors on CO_2 power. He has now converted it to KP 01 power; it flies well at 80gm all-up-weight. This is a fairly large, low-aspect-ratio model of some 25in span, so it must have been very light to start with. Doug Sheppard has just revealed his latest KP 01 powered scale job. This is an American Eagle parasol lightplane of 24.1/2in span, weighing in at 82gm ready to fly. The motor is a standard unit, but is fitted with the optional speed control resistor. It certainly needs this to limit altitude indoors since the model will fly with the speed wound well back. This little job has a wing loading of just under 5oz/sq ft and conforms to my own rule of thumb for electric free-flight with geared units; namely, to try to maintain an airframe weight of no more than double the motor and battery weight, in order to keep the wing loading below 6oz/sq ft. This usually gives a nice, slow, scale-like flight. A direct-drive system usually means faster flight, so the wing loading can go up to nine or even 10oz/sq ft, but inferior efficiency means that you have to limit airframe weight approximately to the motor/battery figure to



Above: D7 close-up. Four 100mAh cells used. Layout couldn't be simpler! Below: Twin-boom C/L model from Hong Kong uses traditional 'juice down the lines' approach. Note coupled flap and elevator.



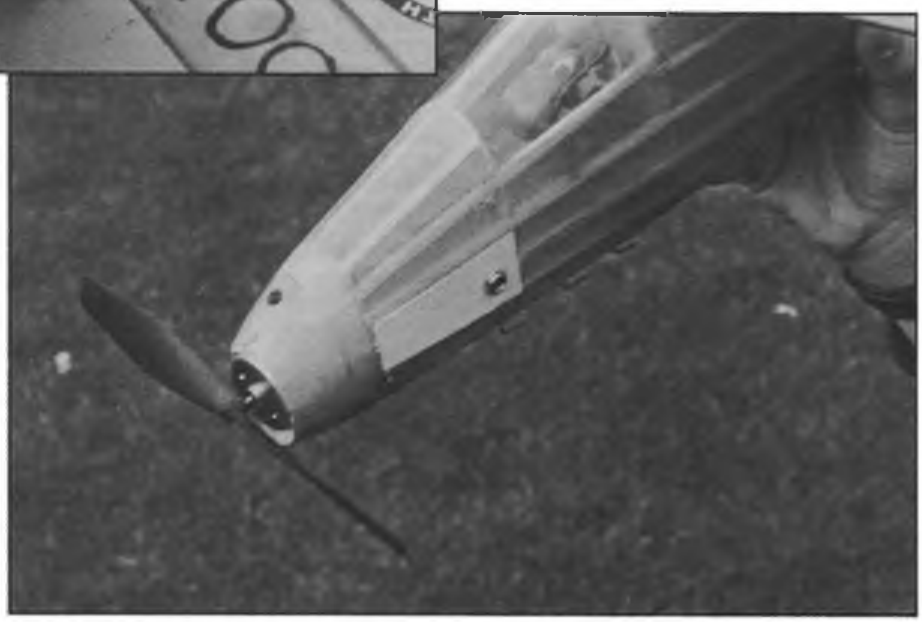


maintain a good performance. Beware the vicious circle of fragility and speed...

Duration jottings

On the subject of performance, it is interesting to observe that it is not only scale enthusiasts who are making electric models. For some time now my own club (South Bristol MAC) have allowed electric duration models to compete in the same class as CO_2 models. The only rule has been to limit the battery power to three 50mAh cells on the Union and KP 01 units. So far no-one has built a serious contender. However, recent experiments with an old and heavy converted CO_2 model have shown considerable promise. The model came out at nearly 80gm ready to fly, very heavy by CO_2 standard even given the 32gm of motor and battery, but climb performance was excellent. This is thanks to the consistent and sustained high power that is delivered for 35-40 seconds. This put the model at sufficient height for an easy two-minute max, and it punched up through ground turbulence in a very sure fashion. An airframe weight of 25gm seems easily achievable, giving a target flying weight of less than 60gm. The model needs to be fairly large (perhaps 200sq in) to maintain a reasonable glide. Hopefully the sheer consistency of the motor run should give an advantage too, particularly on cold, damp days which we seem to get so often in a typical summer! It is interesting to note that in the USA electric models for F/F duration are limited to a 25 second motor run to keep performance at a manageable level.

Still on the duration front, Dave Hanks, one of my clubmates, lost his first electric duration model after changing the prop for a smaller, higher-revving one. The model itself was about the cheapest and simplest electric you could wish for. A Mabuchi 140 was glued into the front of a simple box fuselage and driven from three 50mAh cells. Direct drive was used, initially to a Telco prop and then a four-inch Harry Butler electric RTP type prop (still available from Ballards – see regular *Aeromodeller* ads). The 32in wing was of simple, single-spar light construction, as was the tail. All up weight was around 60gm and it certainly flew OK – not perhaps with the zip of a geared unit, but excellent as a sport flier and introduction to the hobby. A drawing of the basic outline and construction details is shown so that you can all try one! The motor should be in stock in your local shop or from MFA; cells and props from Knight and Pridham.



Toys like this contain a fine motor, 3:1 ratio gears and free battery! Cost – just £1.49 in Asda stores...

Charge up

Finally, some more words on charging. I have recently been experimenting with a field charger for small 50mAh cells. I normally use a large nicad pack of six cells and my own transistorised field charger as featured in the first article in this series. Not everyone who starts off wants to go to even this level of complication, so I have tried four 'D' size Duracells connected in series directly to the three-cell nicad flight pack. This gives a charging current of about 0.5amp, so I leave it on for five minutes as a maximum. I have not yet worked out how many afternoons' flying you can achieve on one set of Duracells. All I can say is that mine have not gone down yet after several short flying sessions on the local playing field. I note that KP are now producing a neat little field charger based on four 1.2ah nicads in a plastic case. A mains charger into which you can plug directly is also part of this setup. This is an excellent alternative for those of you who – like me – forget to buy new batteries and end up rushing out at about midnight to put the nicads on charge!

Top: The writer's own electric C/L model weighs 240 grams, flies on 35ft lines and can wingover with ease. 380 motor; six 225mAh cells on board. Above: Converted F/F KK Topper. 280 motor, four 100 mAh cells and K P prop.

I have mentioned Maplins as a useful source of bits and pieces for charging purposes. Although they are mainly a mail order outfit there are some branches in major towns. In particular I find them useful (and amazingly cheap) for charging sockets and plugs. The 2.5mm components I use in my models are part number HF78K for the switched open socket, HF76H for the jack plug, and HF 791 for a line socket which is a neat way to finish off the dummy charging lead if you use the switch in the model socket as shown previously. Another very useful item is part number HW12N, which is a plug to fit into your car lighter cigarette socket. This can then be used to power your field charger with no feat of flattening your Duracells! Maplins' mail order department can be contacted on 0702 554161.

Don't forget to keep us informed of your electric exploits. We should all like to learn and benefit from your experiences!

WHAT'S ON

16th April
VINTAGE, PANNETT AND KAY MEETING FF
Venue: Driffield. Vintage Cup, Pannett Trophy for Open Power, Kay Trophy for Glider. Contact: Dennis Davitt.

23rd April
MODELVILLE '89
Venue: Crookhorn School, Stakes Hill Road, Waterlooville, Portsmouth, Hants. 10am-5pm. Adults £2 Children/Senior Citizens £1. Model aircraft displays, boats, railways, engineering etc. Trade stands. Free parking. In aid of Rotary charities. Contact: Peter Tipping. Telephone: 0705 595145

23rd April
SPRING MINI AND VINTAGE MEETING FF
Power, HLG,
Vintage, SOP. Contact: BMFA.

23rd April
BMFA INDOOR SCALE NATIONALS FF
Venue: Alumwell Centre, Walsall. M6, junction 10. 8.30 to 5.30. Peanut, Open Rubber, CO_2/Electric, Air Racing. Pre-entry only by 31st March.
Fun events for Kit Scale and Jet subjects - entry on the day. Talks and demonstrations; large static display. SAE to Doug Sheppard, 13, Luckington Road, Monks Park, Bristol, Avon BS7 0UT. Tel: 0272 697595.

30th April
WITHAM CUP C/L AEROBATICS EVENT CL
Venue: Slip End recreation ground, near Luton. F2B, Class 2 Aerobatics. Contact P. Burgess via Glen Alison on 0923 772675.

30th April
WHARFEDALE 1/2A COMBAT EVENT CL
Venue: Dewsbury. Contact: Jeff Smith. Telephone: 0532 663432

30th April-1st May
HOLKER HALL MODEL AIRCRAFT RALLY
Venue: Holker Hall, Grange-over-Sands, Cumbria LA11 7PL.
Contact: Carolyn Johnson. Telephone: 044853 328

29-30th April, 1st May
BRISTOL AND WEST WOODBURY WEEKEND FF
Venue: Woodbury Common. Saturday: Champagne Flyoffs in O/G, O/R, O/P, also Vintage. Sunday: O/G, O/R, O/P, Vintage to SMAE rules. Monday: Five-round combined FAI, Vintage to South Bristol rules. Contact: Elton Drew.
Tel: 0454 415092.

7th May
THIRD AREA CENTRALISED MEETING FF
Venue: Areas. F1B for Weston Cup and Plugge points; O/P for White Cup; O/G. Contact: BMFA.

7th May
THIRD BMFA CENTRALISED MEETING CL
Venue: Hullavington. F2B, F2C, Open GY, British GY, B T/R, F2D, Handicap Speed. Contact: BMFA.

7th May
FACCT THERMAL SOARING RALLY RC
Venue: Frogsnest Farm. BARCS League event. Pre-entry £2. SAE + frequency to N.G.Webb, The Bungalow, 13 East St, Fritwell, Oxon, OX6 9PXJ

7th May
BMFA C/L SCALE EVENT CL
Venue: RAF Hullavington. Contact: Vic Wilson. Tel: 0734 471984

13-14th May
1989 ST. ALBANS & DISTRICT MODEL ENGINEERING SOCIETY EXHIBITION
Venue: Main Hall, St. Albans College of Further Education, Hatfield Road, St. Albans. Saturday: 10am-7pm; Sunday: 10am-5pm. Adults 70p, children and senior citizens 35p. Contact: K. Chiesa, 49 Mount Drive, Park Street, St. Albans, Herts.

14th May
CHEDWORTH R/C VINTAGE RALLY
Competitions and fly for fun. R/C only - sorry! SAM league event. 10am start. Entry £2. Contact Mike Whittard. Telephone: 0453 860793

14th May
CARDINGTON INDOOR MEETING FF
Venue: Cardington Airship Shed. All-in Index and fun-flying. Contact Bob Bailey. Tel: 0438 723642.

14th May 1989
GRANTHAM GRANDPRIX FF
Venue: Barkston Heath. 10am start. O/R for ex Dave Hipperson comp. trophy, O/G for trophy, O/P for Arthur Percival Trophy, combined FAI R/G/P for Barkston Cup, HLG for Bill Fall trophy. Contact: Phil Ball. Telephone: 0332 665361

21st May
ASP LARGE MODEL DAY RC
Venue: Old Warden Airfield. Come and see the best and biggest at our first flying date of the season! Contact: Aeromodeller Telephone: 0442 66551.

21st May
MORLEY & DMAC VINTAGE F/F MEETING FF
Venue: RAF Church Fenton. Vintage cabin Duration for models up to 60in. Proof of authenticity required. BMFA members only. Contact: Stan Horne. Tel: 0532 610429.

21st May
WHARFEDALE OPEN AEROBATIC EVENT CL
Venue: Ilkley. F2B and Class II. Contact: Jeff Smith. Telephone: 0532 663432

21st May
MORLEY & DMAC VINTAGE EVENT FF
Venue: RAF Church Fenton. Vintage Cabin Duration for models under 60in span. Authenticity must be proven; plans, etc. must be provided. Contact: Stan Horne. Tel: 0532 610429.

21st May
THREE KINGS C/L SCALE FLY IN
Venue: Old Croydon Aerodrome, Purley Way, Croydon, Surrey. Stand-off and Profile Scale classes. Silencers and proof of insurance essential. Contact: Wal Cordwell Tel: 01-764 1661.

27-29th May
BMFA BRITISH NATIONALS FF
Saturday: A/1 for British Airways Trophy, CDH for 308 Trophy, 1/2A Power for Hales Trophy, HLG for HLG Trophy.
Sunday: O/G for Thurston Trophy, O/R for Model Aircraft Trophy, O/P for Sir John Shelley Trophy, Vintage for Jubilee Trophy, Women's Cup, Junior Open for Frog Junior Trophy.
Monday: F1A for Ronytube Trophy, F1B for Boxall Trophy, F1C for Eddie Cosh Trophy) FAI events start at 6am), SOP for Falcons Trophy, Tailless for Lady Shelley Trophy.

3-4th June
3 SISTERS GALA CL
Venue: 3 Sisters. Open Speed, F2B and Class 2 Aerobatics, F2C, Open GY, British GY, A Combat, F2D Vintage A and B T/R, OTS, Midge Speed. Contact: John Noble. Tel: 061-790-4056.

4th June
CARDINGTON INDOOR MEETING FF
Venue: Cardington Airship Shed. All-in Index and fun-flying. Contact Bob Bailey. Tel: 0438 723642.

4th June
BLACKPOOL AND FYLDE SCALE FLY IN RC
New, improved format. Same friendly atmosphere. Semi scale. Venue: Blackpool Zoo Flying Site. All welcome. Contact: Chris Bromley, 31 Belmont Avenue, Blackpool, Lancs FY1 4BE. Tel: 0253 25080.

11th June
FOURTH AREA CENTRALISED MEETING FF
Venue: Areas. SOP for Astral Trophy, O/G for Plugge points and Model Engineer Trophy for teams. CDH. Contact: BMFA.

11th June
WHARFEDALE OPEN MINI GOODYEAR CL
Venue: Dewsbury. Contact Jeff Smith. Telephone: 0532 663432

11th June
THREE KINGS C/L SPORT AND VINTAGE DAY
Venue: Old Croydon Aerodrome, Purley Way, Croydon, Surrey. Vintage Stunt, Midge Speed, Vintage A Team Race, Concours. Silencers and proof of Insurance essential. Contact: Wal Cordwell Tel: 01-764 1661.

17-18th June
ASP SCALE WEEKEND RC, CL, FF
Venue: Old Warden Airfield. Not to be missed for the most delightful weekend of scale fun flying ever! Awards for best models, informally judged - but just come along and enjoy. Watch out for more news. Contact: Aeromodeller. Telephone: 0442 66551.

17-18th June
OXFORD MFC F/F RALLY
Venue: Port Meadow, Wolvercote, Oxford. Saturday events at 7pm: Champagne fly-off for A/1 and CDH. Chuck glider comp. Sunday from 10am A1 and CDH in five rounds. HLG, five flights, no rounds. Vintage Rubber (up to 34in), three flights, no rounds. Vintage Glider (up to 72in or A/2), three flights, no rounds, 50m towline. Tailless Rubber or Glider (50m towline), three flights, no rounds. Trophies for top junior and rally champion. No bubble machines, Thermistors or Streamer Poles. Contact: Andrew Crisp. Telephone: 0865 53800

18th June
CHILTERN CUP C/L AEROBATICS EVENT CL
Venue: Slip End recreation ground, near Luton. F2B, Class 2 Aerobatics, Vintage Aerobatics. Contact Rex Landon via Glen Alison on 0923 772675.

18th June
F1E TRIALS RESERVE DATE
Venue: Sheffield. Contact: BMFA.

WHAT'S ON
24-25th June
MODEL & CRAFT SHOW 1989
Venue: West of England Exhibition Centre, Shepton Mallet, Somerset (A371 between Castle Cary and Shepton Mallet).
Indoor and outdoor traders' exhibition and display; demonstration flying, R/C, C/L, F/F outdoor and indoor, plus model boats, cars, railways, collectables, military modelling, crafts, how-to-do-it, lectures, weekend campsite and disco on Saturday evening. Contact: 1 Dibdin House, Mingard Walk, London N7 7RT. Tel: 01-263-9849.

1-2nd July
NORTHERN MODEL SHOW
Venue: Ripon Racecourse. Aircraft displays of all types including helicopters and seaplanes, yachts, submarines, buggies, model engineering, etc. Tradestands, refreshments, amusements etc. Admittance £2.50 adults £1.50 children. Open from 10am - 5pm. Contact; Organisers Office, 75 West End Avenue, Harrogate, N. Yorks, HG2 9BX

2nd July
WHARFEDALE CLASS A DIESEL COMBAT CL
Venue: Ripon Racecourse. Contact: Bob Walker. Telephone: 0423 884505.

2nd July
FOURTH BMFA CENTRALISED (PROVISIONAL) CL
Venue: TBA. F1B, F2C, Open GY, British GY, F2D, Handicap Speed. Contact: BMFA.

1-2nd July
RAFMAA/BMFA F/F MEETING
Venue: RAF Barkston Heath
Saturday: (a) F1A/B/C in rounds, concluded on Sunday.
(b) Champagne flyoff for F1A/B/C.
Sunday: 1/2A, A/1, CDH.
Contact: Flt. Lt. Julian McCormick. Tel: 0526 42581 x 249.

2nd July
BMFA C/L SCALE EVENT CL
Venue: RAF Abingdon. Contact Vic Wilson. Tel: 0734 471984.

2nd July - Date correction
MORLEY INTERNATIONAL F/F DAY FF
Venue: Heath Common, Near Wakefield. Mini-Vintage, Dart Duration for 0.5cc diesels, A/1, CHD, P-30. Contact Stan Horne. Tel: 0532 610429.

9th July
BMFA SUMMER MINI MEETING FF
Venue: Barkston Heath. A/1, CDH, HLG, 1/2A Power. Experiment Mini Vintage (small cash prizes) not plaques; does not count towards Senior Champs points. Contact: BMFA.

9th July
MORLEY INTERNATIONAL SILENT DAY FF
Venue: Heath Common, Wakefield. Events: P30, Mini Vintage up to Wakefield size, CDH, Dart Power. Contact: Stan Horne. Tel: 0532 610429.

16th July
ROLLS-ROYCE MAC VINTAGE C/L MEETING
Venue; RR Airfield, Hucknall, Notts. Events: Olt Time Stunt, Classic and Open Midge, Vintage A and B Team Race. Contact: Terry McDonald. Telephone; 0332 511273

16th July
ASP GOLDEN ERA DAY RC, CL, FF
Venue: Old Warden Airfield. All the fun of the twenties and thirties! Scale and vintage models all welcome. Lympne Scale 89 competition. Period costume desirable. Do come! Contact: Aeromodeller. Telephone: 0442 66551.

16th July
KNAVESMIRE FREE FLIGHT ANCIENT AND MODERN MINI EVENT FF
Venue: York Racecourse. Contact: John Pool. Tel: 0757 703060.

16th July
BMFA S.E. AREA OPEN FREE FLIGHT EVENT FF
Venue: Ashdown Forest. Contact: Mick Howick.
Harriers, Hare Lane, Blindley heath, Lingfield, Surrey RH7 6JB.

16th July
CARDINGTON INDOOR MEETING FF
Venue: Cardington Airship Shed. All-in Index and fun-flying. Contact Bob Bailey. Tel: 0438 723642.

23rd July
BRUMFLY 89
Venue: RAF North Luffenham. Contact: Stafford Screen. Tel: 0384 396535.

25-30th July
1989 CONTROL LINE EUROCHAMPS CL
Venue: 3 Sisters. Contact: BMFA.

30th July
BMFA CLUB CHAMPS FF
Venue: Driffield, O/G, O/R, O/P for Club Champs. Contact: BMFA.

30th July
SHUTTLEWORTH MODEL GROUP OPEN DAY FF,CL
Venue: Old Warden Airfield, Biggleswade, Beds. 9am - 6pm. General model flying of all types. Contact: Mick Staples. Tel: 0223 241978.

5-6th August
WOODVALE INTERNATIONAL RALLY
Venue: RAF Woodvale. International R/C events.
Trade stands. Vintage Car Rally. Competition and Camping. Contact: John Armstrong. Tel: 051 5266857

6th August
CARDINGTON INDOOR MEETING FF
Venue: Cardington Airship Shed. All-in Index and fun-flying. Contact Bob Bailey. Tel: 0438 723642.

19-20th August
ASP VINTAGE WEEKEND RC, CL, FF
Venue: Old Warden Airfield. The annual pilgrimage. Two days packed vintage fun. Informal awards, ASP and SAM 35 competitions. More news to come. Dont miss it! Contact; Aeromodeller. Telephone: 0442 66551

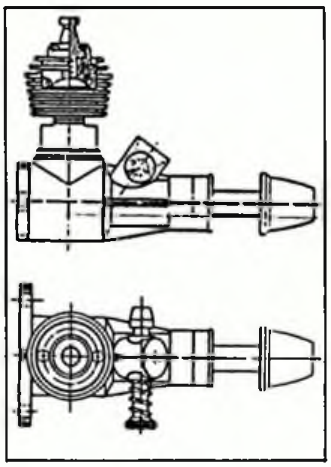
19-20 August
PLUMPTON MODEL SHOW
Venue: Plumpton Racecourse. 10am - 6pm both days.
Everything from Chuck Gliders to jet R/C models.
Many more attractions including full-size Cri-Cri demonstration. Cars, boats and planes, trade stands, bar and fair ground. Live band of Saturday evening. Return coach trips to brighton. £20 family ticket (after 6pm, Friday until Monday morning) or £2.50 per day (adults), £1.50 per day for children and senior citizens. Contact; Dave Bishop. Tel: 095 977550.

27-29th August
BMFA RADIO CONTROL, CONTROL LINE AND SCALE NATIONALS (PROVISIONAL)
Venue: Barkston Heath. Details to follow. Contact: BMFA.

26-27th August
BMFA INDOOR NATIONALS
Venue: Cardington Airship Shed.
Saturday: (a) EZB for Houlberg Silver Trophy - best 2 from 6 flights
(b) Index for Manhattan Cabin, Flyrod (Novice only), HLG, Pennyplane, Novice Pennyplane, CO_2 Duration and PND. Best single score from 6 flights.
(c) CO_2 Duration for Sparklets Trophy. Best 2 from 6.
(d) CO_2 Duration for Sparklets Longest Flight. Best flight from 6.
(e) Fun flying.
(f) Sweepette Trophy for Indoor HLG - now an Index event for (i) Special rules models: 18in min spar, 22in max span, 10gm max weight; and (ii) 12in max HLG
(iii) Open HLG
Sunday: (a) F1D for Aeromodeller Trophy. Best 2 from 6.
(b) 1990 F1D W/Champs Trials - first three flights; best 3 from nine to count.
(c) Fun flying.
Contact: Bob Bailey. Tel: 0438 723642.

HANGAR DOORS

Continued from p.244



Left: Actual size – the new Wasp .010 glow now available in small numbers. Above, Rothenberger welding set is a new offer from our Readers' Services department. Below: Be a BMFA Team Supporter and add your own weight to future UK competition success.

so unusual, that we thought we'd mention it straightaway. The Wasp .010, clearly inspired by the late, lamented Cox TD of identical size, is now available in small numbers from Michael's Models. Weight is eleven grams; peak power, it is claimed, is delivered at speeds in excess of 22,000 rpm. We haven't yet seen the motor itself, just a photograph and maker's literature, so intending purchasers must conduct their own research. Michael's Models' address appears in the advertisement section of this issue.

Stick it!

On your box – where else? The new 1989 British Team Supporters' sticker, which costs just a quid, shows that you're backing British Teams abroad, for your donation helps them face the World's best. No better time, either – look at recent success. Neil Gill's Silver and the C/L World Champs; Pete Halman better-than-ever, and highest-placed Western European in Speed at the same event; Stafford Screen's fourth place at the F/F Euro-champs; and British Team Gold, and Peter McDermott's individual Silver, at the R/C Scale World Champs, shows that we're going up and away! Spare less than the price of a bottle of cyano and send your cheque (payable to BMFA Team Support Fund) to Team Stickers, BMFA, Kimberley House, Vaughan Way, Leicester LE1 4SG, plus a SAE to take the sticker (4.1/4 in diameter). Club packs cost just £25 for twenty. Do it!

Shuttleworth starter

Please note that our first ASP event at Old Warden, Large Model Day, is on 21st May and not as detailed in the April issue.

RAFMAA romp

Confirmation in What's On next month, but here's advance news of the annual RAFMAA/BMFA meeting at RAF Barkston Heath on 1-2nd July. The programme includes FAI and Mini F/F comps. Contact Flt. Lt. Julian McCormick on 0526 42681, extension 249, for details.

Indoor at Shepton Mallett

Late news – Bob Bailey informs us that the Indoor Index event originally scheduled for 25th June at Cardington will now be held at the Royal Bath & West Showground, Shepton Mallett, where the 1989 Model and Craft show is taking place. Other changes are to CO_2 Duration for the Sparklets Trophy on 26th August (now for the best two flights from six on that day) and to the Sweepette Trophy on the same day, which is now an Index event. Both have been incorporated in What's On.

Search for an Aerostar

Remember the Aerostar control line aerobatic model? So does Mr. C.R. Henderson – but he wants to build one to bring the memory alive. Trouble is, the kit is no longer available. Can anyone help with plan, dimensions or other information? If so, call us at *Aeromodeller* and we'll pass on the goods.

Welding Set Service

ASP Readers Services have prepared an interesting package deal welding set in conjunction with Rothenberger.

The Rothenberger ROXY 50L kit is a genuine oxy-butane/propane system with a maximum flame temperature in excess of 3000°C enabling silver soldering, brazing and fusion welding of a large range of ferrous and non-ferrous metals.

The selected set comprises replaceable fuel gas and oxygen cylinders, control valves, regulator, hoses, handpiece, five different size nozzles, goggles, spark igniter, set of welding rods (silver solder, brazing rods, welding rods) and a carrying stand. Full instructions for operation of the equipment are included although it is expected that the purchaser will understand the principles of welding and brazing. The outfit is supplied in a robust and colourful carton.

A back-up service for replacement oxygen and fuel gas supplies is available either via Rothenberger stockists or through ASP Readers Services mail order department.

Price is £69.95 inclusive of VAT, postage and packing. Order Code: RKIT. Credit card orders can be taken over the telephone on 0442 66551.

Magnet matters

Trevor Faulkner reminds us that the FIE (Magnet Steering) trials for the 1989 World Champs will be held on 21st May, with 18th June as the reserve date. The Championships will take place on 19-24th September at Nowy Targ, Poland. See International What's On for news of this and other overseas events.

Showtime!

Glenda Bracken passes on news of the Model & Craft Show to be held at the Royal Bath & West Showground on 24-25th June. Focus will be on active demonstrations rather than static displays, but indoor and outdoor trade exhibition will be extensive. Every type of model flying is there to be sampled, as well as boats, cars and railways. On-site camping is available from Friday evening. At least eighteen hours of active modelling is to be expected. See What's On for more details; more news in Hangar Doors nearer the date. This event is, effectively, a replacement for the proposed BMFA show which failed to get the go-ahead earlier this year.

1066 and all that

News of a new UK SAM chapter. David Baker has established SAM 1066 to cater for Vintage enthusiasts who wish to concentrate on old time aeromodelling as originally defined, that is, pre-1951 – with special emphasis on pre-war design. Interested? Call David on 0604 406822.

We're moving...

...just a mile or two up the road to Argus House, our brand new premises at Boundary Way, Hemel Hempstead. Purpose of the change is to unite our Hemel and London offices so that all magazines, Plans and Readers Services, advertising and accounting offices, Exhibitions and Book companies – in fact, the lot – are working under one roof to give you even better value for money, and more to anticipate. The all-encompassing telephone number is now 0442 66551.

SAM 35 Yearbook No 5

Our April review of the splendid new addition to the SAM 35 Yearbook series omitted to mention that cheques should be made out to SAM 35, not to Ron Knight, who, happy to handle distribution, would much rather not have the hassle of transferring vast amounts from account to account. So – cheques payable to SAM 35; send for the excellent Yearbook to Ron at 14A Enmore Gardens, London SW14 8RF.

Wet and Windy Coupe

Jon Ward tells us that the 50th French Coupe d'Hiver contest at Reau-Villaroche on 26th February was held in less than desirable conditions. The ROG rule was waived and the max cut to 90 seconds. Messieurs Galichet and Brand, first and second respectively, were the only fliers to max out. Third was the legendary Emmanuel Fillon, with Junior Philippe Naud in fourth spot. Top of two Brits was Jon himself at 16th; John White a little further down at 48th. Some interesting designs, apparently; more news later...

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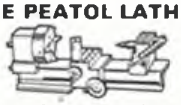

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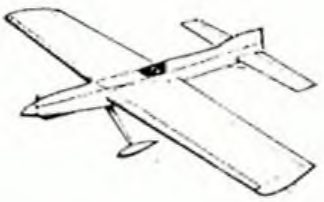

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Links to the plans

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Bottle Baby by Bert Pond
FF powered by compressed air engine in VINTAGE CORNER
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Compressed Air Model by Jim Noonan
FF powered by Hoosier Whirlwind Motor in VINTAGE CORNER
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BUTTERFLY by Backstrom
Swallow Tail Full Size Plan
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FOUND CENTENNIAL by Rob Presnell
FF Rubber Fun Scale
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Supernova by John Cuthbert
FF Glider Kit in "FREE FLIGHT SCENE"
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Twin Boom C/L Model
C/L Electrico Model from Hong Kong in HIGH POTENTIAL
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