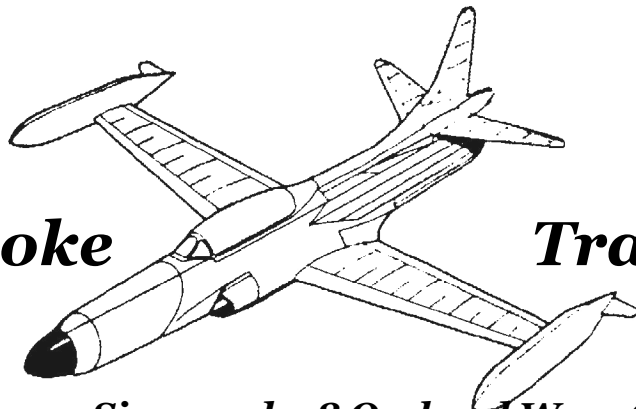


Smoke

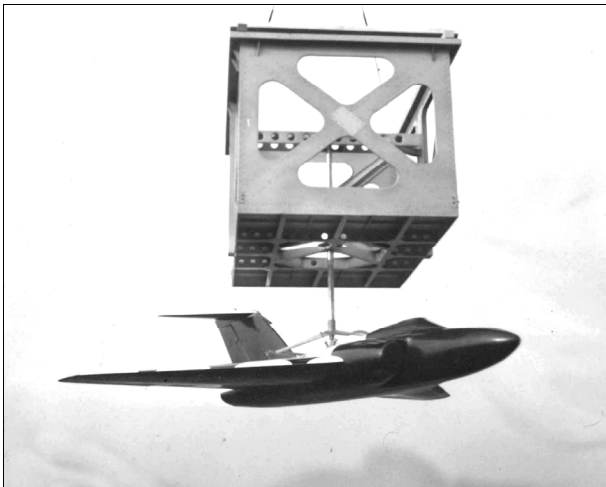
Trails 25



**Roger Simmonds; 8 Orchard Way, Offord Darcy,
PE19 5RE; rsimmo@globalnet.co.uk**

Feedback

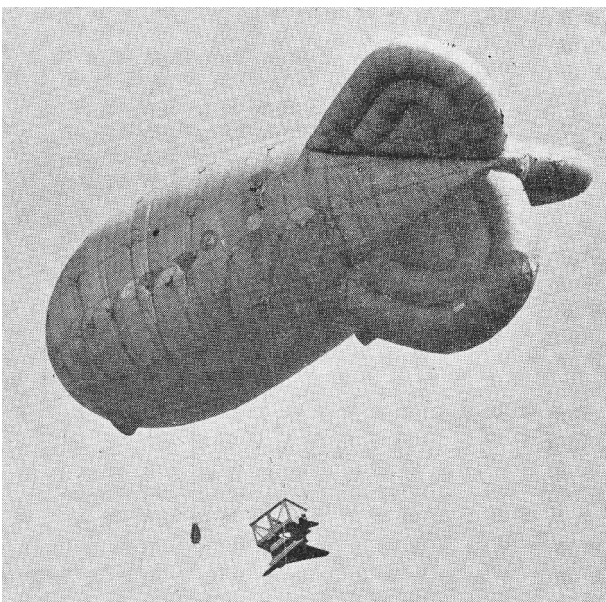
Two topics in recent articles have generated a gratifying amount of interest, so a 'follow up' is definitely required. That neither is more than tangentially to do with rocket propulsion in general or 'Jetex' in particular is thought provoking: perhaps someone is trying to tell me something!



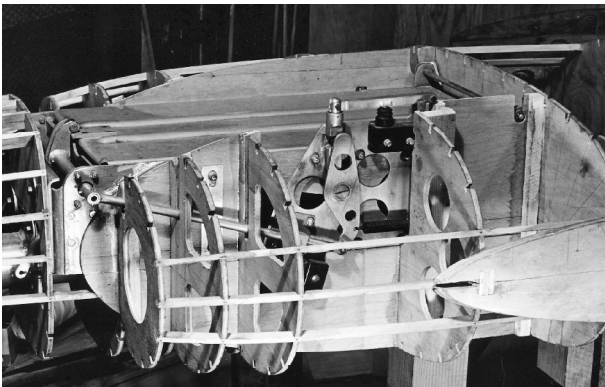
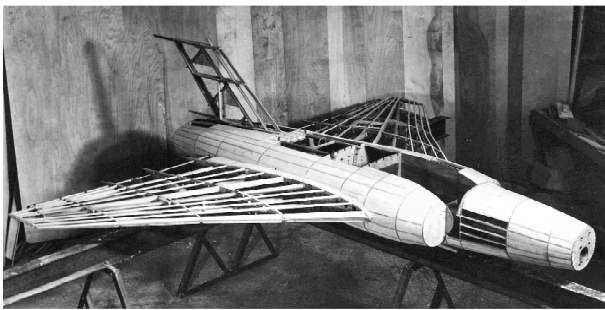
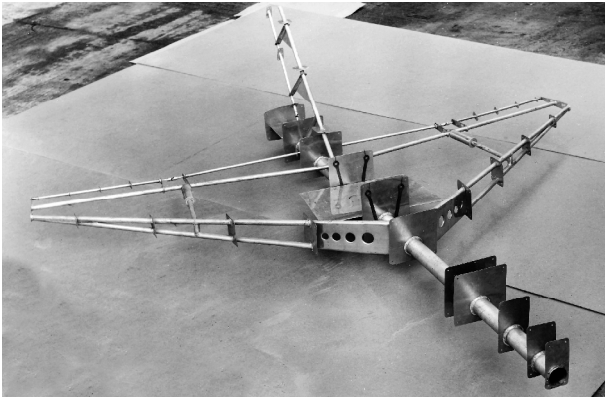
My brief description of the large model Javelins built by Bert Judge, Mike Ingram and Peter Cock and others at Wilmot Mansour has left several readers wanting more; so here are some more photos from Mike's archive and a hitherto unpublished story from Ron Moulton.

First, to recap the background and put Ron's story in context, I can do no better than quote Mike's introduction to these historic photos: "In 1954, Farnborough asked Wilmot Mansour if they could supply *two* dynamic scale models of the Gloster Javelin to test the spinning characteristics of this new delta wing aircraft. If it got into a spin could he [the pilot] recover in the usual manner? As the tests proved, he could! The model was dropped from a balloon in spinning mode, and then a clockwork timer mechanism moved the controls to the spin recovery position. Finally, a parachute was deployed to bring it safely to earth". Also pertinent to Ron's story is our editor's review of DW Allen's 1954 article, "Development of Radio Control for Model Research" (*SAM Speaks* 09/04). Here now is Ron's story:

"Throughout 1954/5 stories leaked out from Cardington that some large and heavy models were being launched at height from a Barrage Balloon. The purpose of these tests was to determine how to correct the extreme control difficulties shown by prototypes of the Gloster Javelin [due, it was thought, to the tail being blanketed by the wing in certain configurations].



Top: Mike's caption reads: "Hanging from balloon cradle"; **Bottom:** "Hanging from the balloon, July 1955."



Above: Photos taken by Peter Cock during construction (from Mike Ingram's archive). **Top:** aluminium tube chassis; **next;** ply formers and ribs bolted on; **next:** spruce stringers and longerons added, fuselage with balsa infill, wings awaiting skin of thin ply; **bottom:** clockwork control mechanism.

These problems were then subject to the Official Secrets Act, and only when Sqdn. Ldr. Bill Waterton A.F.C. was awarded the George Medal for saving a prototype (and himself) after flutter caused the loss of all elevators was there any public revelation that the Javelin was in trouble. A particularly worrying characteristic was that if the nose was held up and the speed bled off below 100 knots the Javelin would yaw, whilst at the same time entering an opposite roll, and then fall into a spin from which recovery proved difficult. The Javelin model would be airdropped from a balloon and pre-programmed with control sequences in an attempt to resolve this.

At that time, The R.A.E. at Farnborough had a deep mistrust of radio control despite having two LSARA leaders, Messrs Allen & Annenberg, on their staff; but at least they appointed a highly qualified operator, Sqdn Ldr Bill Verney, to the team at Cardington. Bill was a brilliant organizer in the RAFMAA and an R/C pioneer. Bill was not allowed to tell the full story of the several launches from 5,000 ft, but he did share a few snippets, and he had more than a few "moments" in the basket when the dynamic model, loaded up to almost 400 lbs, and one that had to be set to a spin, was released. There was always a sigh of relief when the parachute came out! On one occasion the pre-set controls corrected the spin but somehow the 'chute did not appear. The Cardington team's relief changed to considerable concern as the heavily loaded model flew off, fast and level, in the direction of the village. Fortunately, it landed safely and was recovered intact!

There were many other difficulties with the Javelin, each resolved by dedicated test pilots, among them Wing Cdr 'Dickie' Martin D.F.C., A.F.C., who for many years was in the team of pilots who flew the vintage aeroplanes of the Shuttleworth Collection.

For more information about the Javelin *Profile No. 149* is recommended".

Many thanks, Ron. I don't think that even *Profile No 149* includes the above story. That a large and potentially lethal model was allowed to fly off into the wby (wide blue yonder) with no 'destruct mechanism' is scary – 400 lb of aeroplane could do an awful lot of damage! The RAE's disdain of radio control is disappointing; especially as the Wilmot Mansour team had successfully tested Dennis Allen's proportional control system in a large glider (*JXF 24*). This, too, is a story that needs to be told, but not, I hasten to add, in this column. One does have some standards after all!



Above: Barnes Wallis's 'Wild Goose', an (intermittently) radio controlled model of his proposed supersonic 'aerodyne', thunders down the track on its rocket-propelled sled.

The 'Establishment's' attitude to R/C makes some sense, perhaps, in the light of the contemporaneous, and troublesome, experiments with Barnes Wallis's innovative 'Wild Goose' (and later 'Swallow') variable geometry aerodynes. In retrospect, these sound a lot of fun, but were more than a little frustrating for all concerned at the time, Wallis commenting, "It took us longer to develop the radio control than the models!" Incidentally, this story, and many others, can be found in a splendid new book, "Bouncing Bomb Man", by Iain Murray (Haynes 2009). Highly recommended, – just perfect for that Christmas book token!

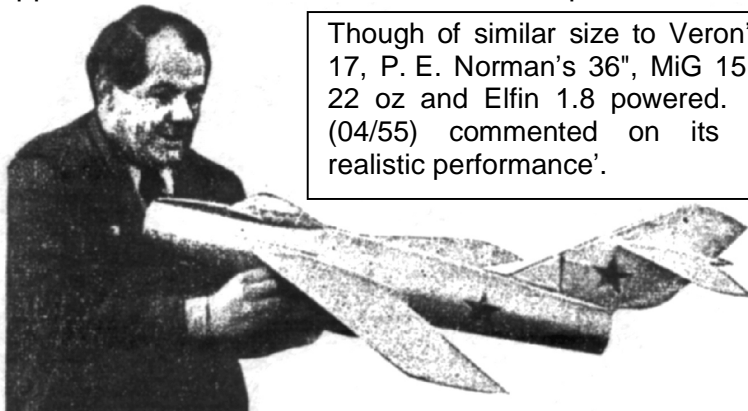
More about Ducted Fans

Last month's story of Peter Coombe's restoration of Veron FD 2 (which, he is anxious to point out, was originally well-made and well-flown by Paul Brazier), brought a nice letter from Phil Smith himself: "There is still a lot of interest in adapting the La 17 and FD 2 to EDF, and I am selling a lot of plans! I believe I met Peter at Middle Wallop when the FD 2 was still covered in heavy red enamel. It's nice to know of his success.

The La 17 fuselage was suspended from wire (Laystrate) which ran from a washing post to a tree some yards down the garden. The rollers were those used in a Lancaster bomber to direct the trimming cable from the cockpit to the empennage surfaces. Thus I was able to judge the thrust available before venturing on to free flight. I still have the engine (Allbon Dart) and Impeller from that original model. Needless to say, I used doped up fuel to create about 16,000 rpm to give me all the thrust I needed. The Hawker Hunter was again for a 0.5 cc [not, as I had thought, a 1.5 cc] diesel. It was marginal on performance and 'crabbed' a little. It should have had a Cox engine [TD 051] and would then have performed better. It never came out as a kit due to not being financed – the directors felt it had limited scope for sales and my efforts had to be directed towards more profitable designs. I have, though, sold quite a few plans to friends interested in EDF versions.

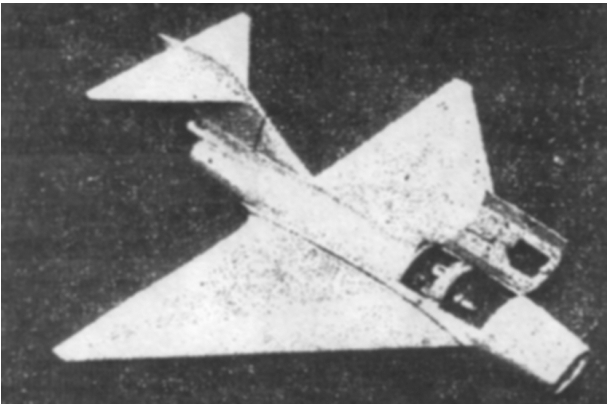
I made several other D/F designs during development, including a Skyray and an Avro 707, again for 0.5 cc engines. Both were quite successful, but, again, never produced as kits for economic reasons. The drawings of these were sent to my great friend Dave Platt in Florida, who enlarged them and produced models with K&B 40 motors in them.

After my article came out in *Model Aircraft (MA)* in June 1952, I had a visit from a fellow driving a red MG sports car – none other than P. E. Norman! I gave him quite a lot of info on my efforts and even three experimental impellers, including an early multiblade. All of these appeared in his article about ducted fans published in an American magazine.



Though of similar size to Veron's La 17, P. E. Norman's 36", MiG 15 was 22 oz and Elfin 1.8 powered. *MA*, (04/55) commented on its 'very realistic performance'.

His models were very successful with engines of larger capacity – something I was not allowed to do, being limited at Veron to stock engines from Allbon, ED etc, none of which were high performance racing engines. If only we had Cox engines available, but they didn't come out until much later".



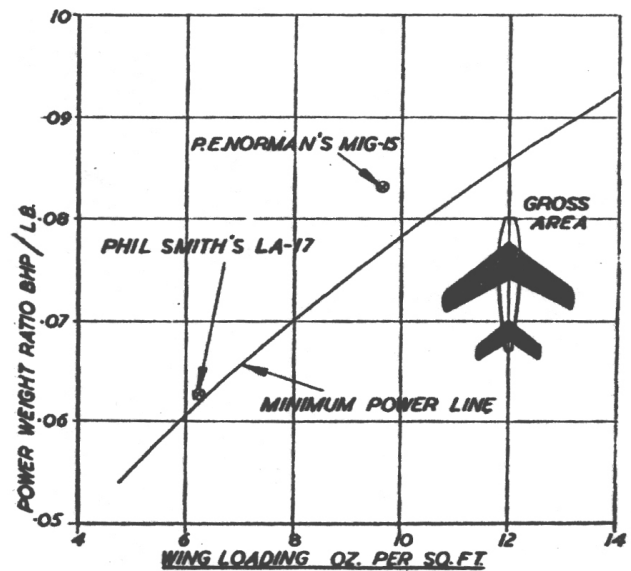
Top: Mike Ingram launching the 10' R/C Glider made by Wilmot-Mansour in collaboration with the LSARA. Mike remembers it was 'quite a handful'.
Middle: ditto with 'Clusters of four J 350s' in each wing!
Bottom: P E Norman's BP 120 powered by a mighty Elfin 2.49 with what appears to be a Veron Impeller.

Here are some reflections on Phil's comments:

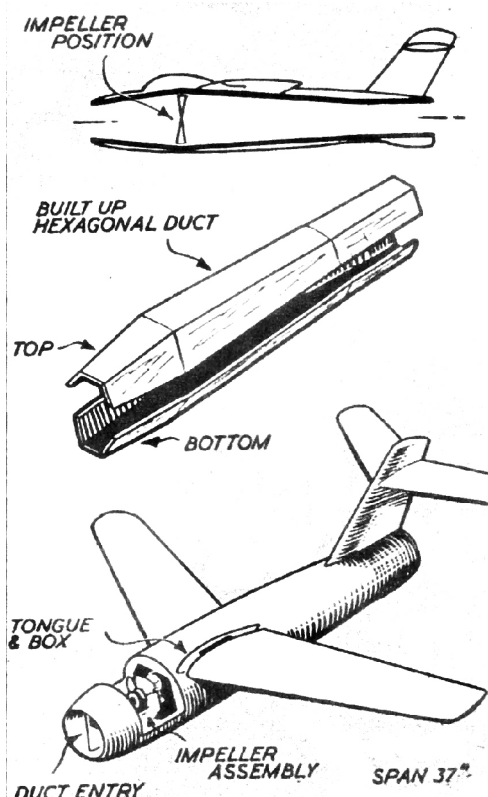
1. Has anyone got a copy of P E Norman's US article, or a reference thereto? I wonder if Dave Platt kept the original plans of Phil's Skyray and 707. It would be marvellous if these could be tracked down. Being deltas, they should be as airworthy as the F D 2.

2. Phil's article in *Model Aircraft* June 1952 was prescient in many ways, and a perusal thereof would prevent some of the more egregious errors seen on recent 'micro EDF' designs, – for example tapered ducts. One of Phil's apothegms quote is well worth quoting: "Candidly, the only kinship between ducted fans and jets is that they both produce 'draughts', but there the similarity ends".

3. Now here is a neat coincidence: an erudite article, "New Facts on Fans", was published in *MA*, 04/53. The author was none other than Mr M M Gates, designer of the Ghoul (*Smoke Trials* 6). As befits the author's B.Sc (not mentioned in the article), there are a few equations and what is, on the face of it, this rather nice graph:



This purports to show that Norman's approach of 'large engine, high power' gives a better margin. However, the data point for the La 17 is surely wrong: the 14 oz La 17 had a wing loading of 8 oz/sq ft, and therefore needed a PWR of at least 0.07. Being optimistic, and assuming the Allbon Dart delivered 0.05 bhp with Phil's specially doped fuel, then the relevant data point is $0.05 \times 16 / 14 = 0.057$ – distinctly marginal. But the graph does show that reducing the wing loading pays dividends: the FD 2, with its wing area of about 2.7 sq ft and 16 oz weight had a wing loading below 6 oz/sq ft. Assuming the AM 10 gave 0.07 bhp, then the PWR is 0.07 – quite healthy. Even so, Phil said the FD 2 was really a 'powered glider'. Peter's FD 2, with its 30 oz thrust, has a sparkling performance and is way off the graph. But it's not (yet!) EDF: any advice about a suitable 'EDF power train' would be very welcome.



MA reviewed the La 17 in October, 1952. 'Over the Counter' (from which the illustration left is taken) opined: "Though not a beginner's kit, it cleverly solves the problems inherent in a ducted fan design, and is up to Veron's high standard of quality". Interestingly, the accessories in the kit included a "pre-fabricated impeller which, according to the instructions 'Only needing bending to pitch'. Sounds tricky to me!

Phil says he was inspired to develop ducted fans after his experience with Jetex (and presumably with his own, still born rocket motors). Apropos of these, he finishes his recent letter: "One observation, if I may be so bold: you wrote, "I experimented with cordite" – not so, it was in fact the substance used in Coffman cartridges that I rescued out of an 'over-stressed' Beaufighter that was written off. My job was to make it 'safe', which included clearing the cartridges under the wheel bay. If my memory serves me, the explosive was Amatol, reminiscent of candle wax, which was a munitions charge under pressure, but produced a charge of gas (and smoke) when not under pressure".

Hmm ... I'm not sure this can be so: Wikipedia says that Coffman starter cartridges were filled with cordite. Now cordite could be formulated to give, in the phrase of Alec Hutchison, developer of the ICI Jetex fuel, a 'WHOOSH rather than a bang". Amatol, being a lethal mixture of TNT and ammonium nitrate, would surely detonate in all circumstances and be a most unsuitable rocket fuel. One can only be grateful that Phil did not put Amatol in his rockets and so lived to create so many well-loved designs for Veron!

It would be nice to know what the 'average modeller on the flying field' thought of Veron's innovative jets. SAM member Walter Snowdon sent me this nice reminiscence:

"I started aeromodelling as an eight year old. We lived on a farm in the late forties - early fifties, so I had no contact with other modellers and it was a steep learning curve! I went to Darlington for only a couple of hours on a Saturday morning, and blew my pocket money on either a small 'Flying Scale' kit [oh dear!] or a 'solid' which was built quickly ready for the next trip. By the time I left school I had worked my way through the complete range of Frog, Keil Kraft, Skyleada, Veron and other makes of small models. When I was 17 I worked in a large model shop for a year – drunk in a brewery syndrome! – getting my hands on myriads of new kits and talking to lots of modellers. And I got paid for it plus a handsome discount! It was paradise! One Day a Veron rep arrived and said, "Would we like a factory built FD 2 model to Display". Gasps of amazement! He brought this beautifully built model from his car and plonked it on the counter with the words, "It's yours as long as it is kept on show". It hung from the shop ceiling untouched for at least 20 years in the Darlington shop until it closed.

Newton Aycliffe Model Flying club had a wide range of interests, including ducted fan. My first was the La 17, which built pretty easily, though the wood for the six-sided duct was rock hard and heavy. It was finished in dark blue tissue and test glided and trimmed over a very long meadow. Firing up the diesel took three of us – two holding, and one wielding the leather bootlace! Finally, it was running and quickly launched. It flew across the field at about 15 feet, never climbing or dropping at what could be described as a fast saunter. Lots of 'tweaking and tuning' got it to climb a bit, but it was no faster and any attempt to make it turn resulted in it just descending and sitting on the ground making loud noises. So I would pick it up adjust rudder and launch again, and off it would go with me walking behind it. No worries about overfilling the tank!

On one occasion it flew out of the field and hit the gable end of building at about 20 feet up and just stayed there with its nose against the brickwork, sliding down gently in the horizontal flying position with the motor still running. I picked it up and launched it on the reverse course. It again ambled off and made a perfect belly-flop when the engine cut. Changing the engine wouldn't induce it to fly faster or higher. It finished up in a fuel-sodden 'Viking funeral'.

My brother had got an F-86 Sabre at the same time, but after seeing my efforts, he gave up on it (he only liked fast models). It was easier to build than the L, but the wood was diabolical, and it never flew, as no matter what I did, I couldn't stop the wings warping. However, these, with their natural warps, made a nice little flying wing which flew well!

I built a Deltaceptor for a friend who had broken his arm falling out of a tree rescuing a model. That was different again. Easy to trim, good wood. It performed perfectly for many months until it flew into a cluster of telephone wires, ending up 'nesting' in the middle with the engine still running! Attempts at rescue resulted in its being wrecked beyond repair. I never built any more ducted fan models after that."

Jetex Matters



Top: Peter Coombe's MiG 29 for L2. Note the beautiful canopy. **below:** Author's rather battered MiG 29, now modified for PAA Loader. Note washout and the large thrust tab.

Readers will remember I have been trying to fly my MiG 29 'Fulcrum' all year. Peter Coombe remembers seeing George Milner-Smith's original win the Jetex mass launch at Old Warden from which its fame emanates: "It was a very cool shape and a clever design, well suited to the modeller who wanted a mean-looking jet without sticks 'n stringers. I knocked up a couple, but found them wildly inconsistent and virtually unflyable". Howard Metcalfe also has experience of the original design: "it is a wayward beast, and should only be flown in the lightest of breezes or flat calm. I have had some memorable flights; after one of which Andy Sephton remarked it was the most scale-like flight he had seen from a Rapier model. High praise! For every good flight though, I have had several disasters and I've rebuilt it many times after it has rolled over and dived in at speed."

In a three-way discussion, Peter, Howard and I identified some reasons for the model's waywardness, viz: lack of 'decalage', (the original is '0-0) and (possibly) tailplane area; (b) lack of dihedral and/or washout. There were also question marks against its (possibly) excessive fin area, the thin all-sheet ($\frac{1}{8}$ " wing, and weight (George's weighed about 2 oz with a Jetex 50C).

Peter's new version has addressed these concerns: he took great care over the airfoil, put about $\frac{3}{16}$ " dihedral under each wing tip, and fitted a larger tailplane and elevators with about $\frac{1}{16}$ " of 'up'. It is also very light (a little under 30g) so Peter was hopeful his Rapier L2s (which were of dubious heritage) would suffice. Peter reports from the flying field: "All three test flights followed a similar pattern: a gentle steady climb into the breeze to about twenty feet followed by a shallow descending circle to the right just missing the ground and an attempt to climb back into breeze, followed by sagging to the ground, huffing and puffing what looked like steam for quite a long while. This caused much mirth to the nearby 'ARTFers' [sic] who of course know nothing about true aeromodelling!" Peter adds that this was his first experience of Rapiers: he found them hard to light (degraded propellant might explain the low thrust). But he says he will persist, though he won't paint the model until it flies properly.

As for my somewhat battered MiG 29, after the debacle at Old Warden I glued it all back together, and fitted a new motor mount an inch or so forward of its previous position. I then took Howard's advice to heart, and waited for really calm conditions. So it was on a beautiful autumn day in October – on which I should have been gardening – that we headed, with some determination, for Godmanchester proving grounds and the year's last flying session.

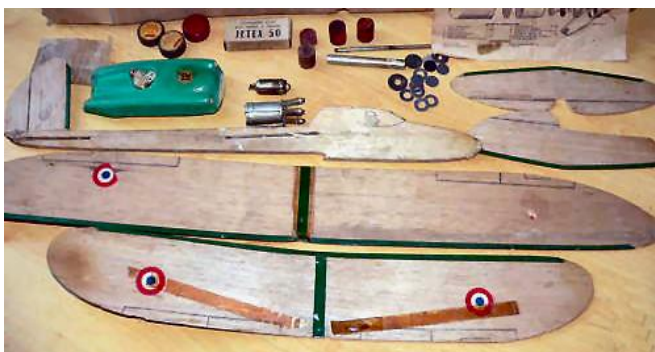
The glide was as flat as I could get away with and dead straight, so I lit up an L4 and away it went. The motors were a gift from Duncan Pepper and perhaps 5-6 years old so there wasn't a lot of power – maybe not even 300 mN – and the nose came up and a mild stall was followed by too slow a recovery and it hit the ground quite hard. More thrust to prevent this 'low power stall' would have been nice, but this I did not have, so I put a bit more Blutac on the nose and a bit more 'down' on the thrust tab. The next launch resulted in a good flight of wide circles at about 20 feet. This was promising, so I persisted, using up all my motors, and had a number of thrilling flights with the model turning first this way, and then the other, presumably in response to nozzle inaccuracies. One of the L4s had a bit more 'oomph' than the others, and the MiG 29 climbed higher and treated us to a genuine 'Fulcrum Cobra manoeuvre'. Very exciting, as it recovered and just carried on!

All in all, this was a most memorable end to the season, a day to ponder as I sit nodding by the fireside. I've always had my doubts about A E Housman's nostalgia. Not anymore! The larger Rapiers generate a pleasing amount of smoke, which, on such a still afternoon, lingered on the field. Perhaps those 'blue remembered hills' Housman (and we) recollect so fondly are blue because they were seen through a haze of rocket exhaust!

The old L4s, or L3s if one can find good ones of at least 300 mN, are well suited to the MiG 29. However, until such time we have Rapiers again, I have now modified mine for PAA Loader, doubting that my Jetex 50s with less than optimum pellets would be 'man enough' for the job. It now looks more than a little agricultural, though in keeping with its Russian roots. With all that wing area I hope it can handle the extra 16g or so, especially with 2 oz (500mN+) thrust behind it. We shall see.

As has been discussed in earlier columns, Jetex wick should be bought with caution. I had thought that this was because it did not age well. However, letters exchanged between Bill Henderson and Sebel/Jetex show that problems with fuses are nothing new. Bill received a letter in Sept 1971 from 'A A Judge, 'Expt. Dept, D. Sebel & Company Ltd', apologising for unsatisfactory wick. Nine months later he received another letter dated 23 June 1972 from H. Black, 'Chief Inspector' for Mobo Toys, informing him, "The factory at Erith is closed down due to a takeover by the Barclay Toy group, and the position on Jetex is in abeyance".

As to Rapiers, there have been some quite hopeful sounds from Castle Zigmund. For example, that Dr Z has successfully tested some new motors and is planning a limited (20 Kg) production run made with the new tubes, which are apparently red, not green. But I have heard nothing from George of SAMS Models and I believe it will be some time before we see these in the UK. I'm obviously not the only person who thinks this: 'Jetex' items (especially 50C's and pellets) on eBay go for record prices these days. But will any of these – for example a genuine Sharky and Swift, and a most interesting French ARTF made by Solido (see below) – be put to their proper purpose on the flying field? Probably not. *Quel dommage!*



John Miller Crawford tells me there was a Graupner Fouga *Sylphe* for Jetex, so I should not have been so surprised that Solido, Wilmot Mansour's French importers, made 'Jetex' products for their home market. *L' Avion Jetex* might be their Gallic equivalent of the Sharky or Sparrow. It is distinctly inferior to both, and in this instance the Brits definitely win in terms of elegance and style!