

Aeromodelling the Fairey Delta F.D. 2 in 1956.



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and
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This booklet has been produced to commemorate the fifty years since the record-breaking flight of the FD 2 in March 1956.

It is published under the aegis of the Jetex website to celebrate the accomplishments of several British modellers who were inspired, in those early days of jet power, to look up in the skies and emulate, in miniature, what they saw. It was not easy!

If you wish to know more about Jetex powered models and their history, or find out about modern free-flight jet models, visit the website at ***www.jetex.org***.

Front cover, clockwise from top left: Pete Smart's modern rocket-powered FD 2 (2006), Veron's Ducted fan in flight (1957), a rocket powered FD 2 in flight (2002), the Jetex FD 2 (1957).

Aeromodelling the Fairey Delta F.D. 2 in 1956

The Fairey Delta FD 2 and its record-breaking flight in March 1956 made quite an impact on air-minded boys of all ages, facilitated by extensive cover on the TV, radio and other 'media' of the day. For example, the *Aeroplane* produced a special supplement (see right), the FD 2 was featured in the *Aeromodeller*, and the popular boys' comic, the *Eagle*, had a special offer for an attractive coloured cardboard model (see appendix).

Model kit manufacturers too, caught up in the mood of the times, were inspired to produce examples of this most charismatic subject. 'Static' models, i.e. plastic kits, were comparatively straightforward, as Fairey were able, and indeed eager, to provide the necessary data; but flying models, and by this we mean 'free-flight' (radio control was in its infancy), were much more challenging. Only two kits, from the well-established firms of Wilmot, Mansour & co and Veron, ever reached the shops.

The problem was not so much the prototype's futuristic shape, as model deltas, both rubber and internal combustion (i/c) powered, had been seen on the flying field, but of finding a realistic means of propulsion.

In those days, when model pulsejets were all but banned and miniature turbojets still 25 years in the future, there were only two viable options: the 'Jetex' range of metal-bodied reusable rocket motors, and ducted fans (impellers) driven by small i/c engines. The former, produced by Wilmot Mansour, could provide thrust for scale models of up to about 24" span. Veron's ducted fans were rather more powerful and suitable for model jet aircraft up to about twice this size.

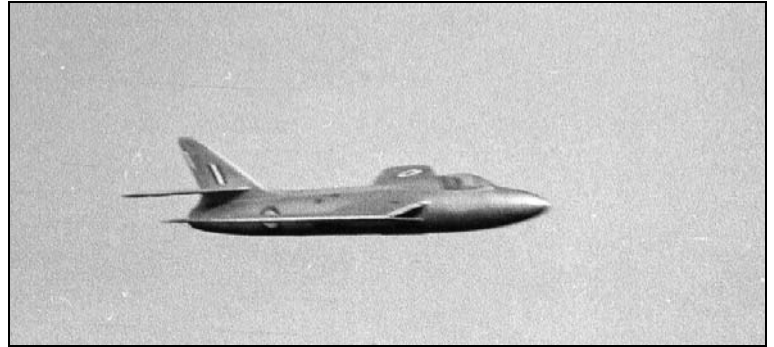


Top right: Booklet produced by the *Aeroplane* to commemorate the record-breaking flight soon after the event.

Above: Two means of 'authentically' powering model jets in 1956: **left:** The Jetex 50 rocket motor, one of the smallest of these eponymous motors, was introduced in 1950, the solid fuel propellant provided a thrust of about 1/2 oz for 15 seconds; **right:** ducted fan for use with small (1-1.5 cc capacity) model diesel or 'glow pug' engines.

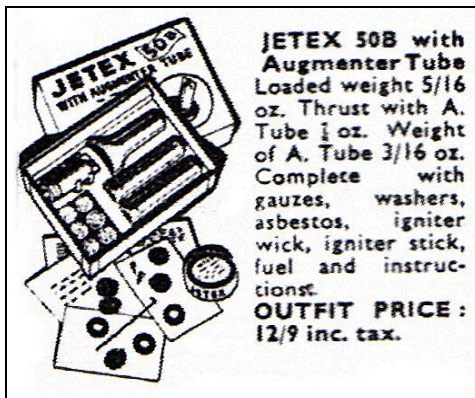
Jetex motors were first demonstrated to the press in early 1948, and were available to the general public in June of that year. They were the inventions of Charles (Bill) Wilmot and Joseph Mansour, who had been directors of International Model Aircraft (FROG), and the development of a practicable means of rocket propulsion for models was, at least in part, born out of their experience of producing rocket-propelled target and smoke-laying drones during the War. ICI developed and manufactured the solid fuel propellant and igniter wick. The motors were available in a range of thrusts from ½ - 4 oz, and Wilmot Mansour (aka 'Jetex') produced a number of kits for model aircraft, hydroplanes and cars to go with them. Jetex made quite an impact at the time: many prestigious modellers and kit manufacturers in Europe and the US used the motors in their designs, and the new technology was widely covered in the modelling and secular press. Jetex won many plaudits and awards.

However, it wasn't until Joe Mansour recruited three gifted modellers in the early fifties, Bert Judge, Mike Ingram and Pete Cock, that he was able to realise one of his long standing ambitions: a flying model jet plane that looked realistic from all angles. The first such model, the 20" span 'Tailored' Hawker Hunter, appeared in 1953 (right). It was powered by one of the larger (2 oz thrust) motors enclosed in the hollow fuselage, firing into a thin metal 'augmenter tube'.



The Hunter was an immediate success, and was swiftly followed by a Supermarine Swift, and then by the smaller models of the so-called 'Tailored' 'Mach 1+' series that included contemporaneous British and US research aircraft and fighters. These were powered by the Jetex 50B, one of the smaller motors, which had a thrust of around ¾ oz with an augmenter tube.

The innovative 'Tailored' kits set new standards of prefabrication at the time, and featured moulded balsa wood fuselage shells, plastic accessories, and an ingenious construction jig that ensured accurate alignment of the flying surfaces — essential for these models, which flew very fast indeed! By 1956, the tailored range was extensive and included a Douglas Skyray, and an F-100 Super Sabre, which, it may be pertinent to point out, had both been holders of the World speed record. Perhaps it was this that inspired Mike Ingram to 'fly the flag' and produce a Tailored FD 2!



Mike designed it as a 'Mach 1+' model — it fitted naturally alongside the Skyray and Super Sabre, and these models were cheaper and more popular anyway. It appeared in the shops in early 1957, by which time Wilmot Mansour had been taken over by Sebel, though the 'Jetex' trademark was retained.



Top right: Bert Judge's realistic Hunter in flight; only the dihedral and absence of pilot give it away!

Middle left: The Jetex 50B and 'augmenter tube', power for Mike Ingram's FD 2.

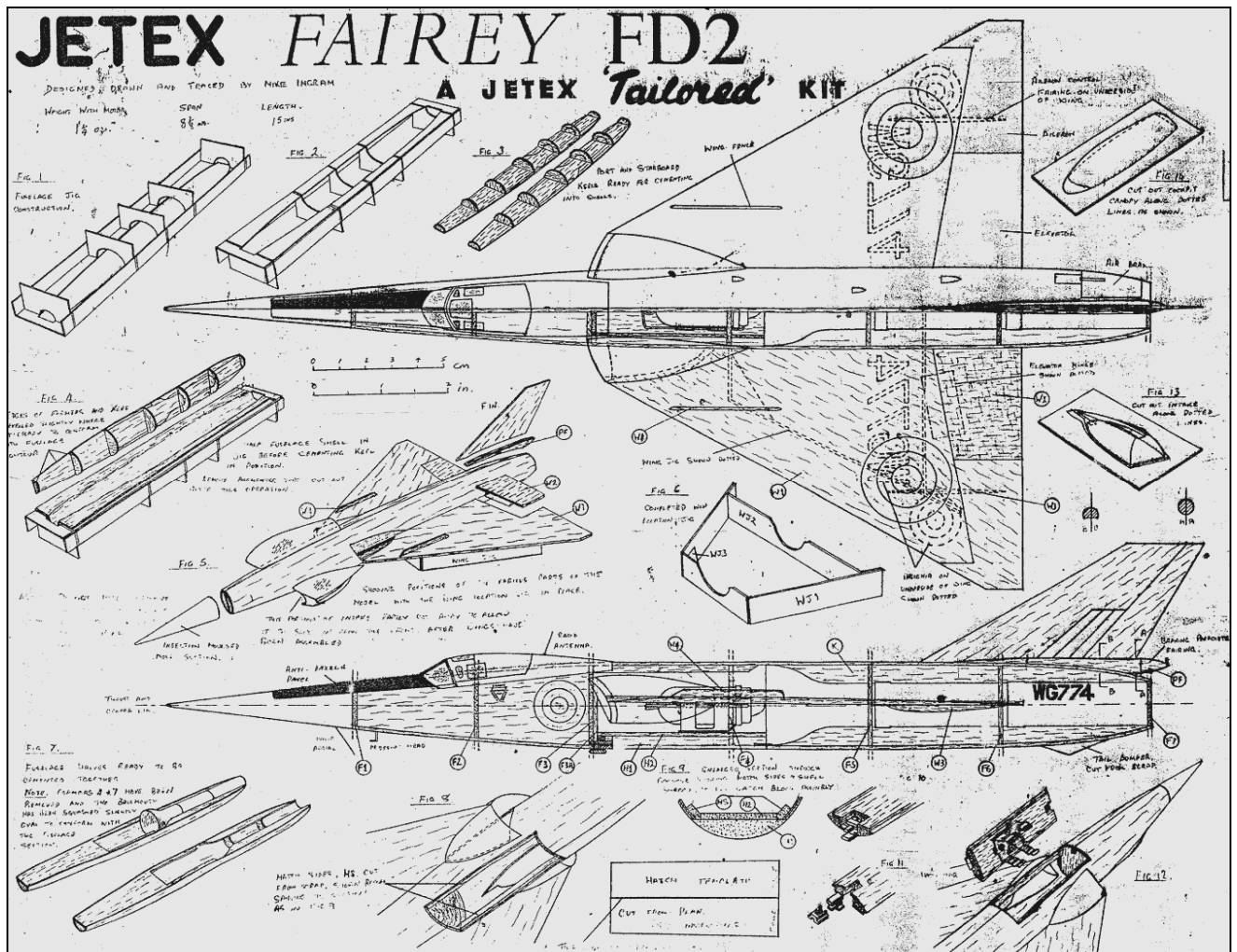
Bottom: Jetex FD 2 advert from 1958 (left); publicity photo of Mike's prototype (right).

The Tailored FD 2, was, just like the 'real thing', a diminutive aircraft, with a length of 15", a span of under 9", and a weight (according to the advert) of '1 oz without motor'.



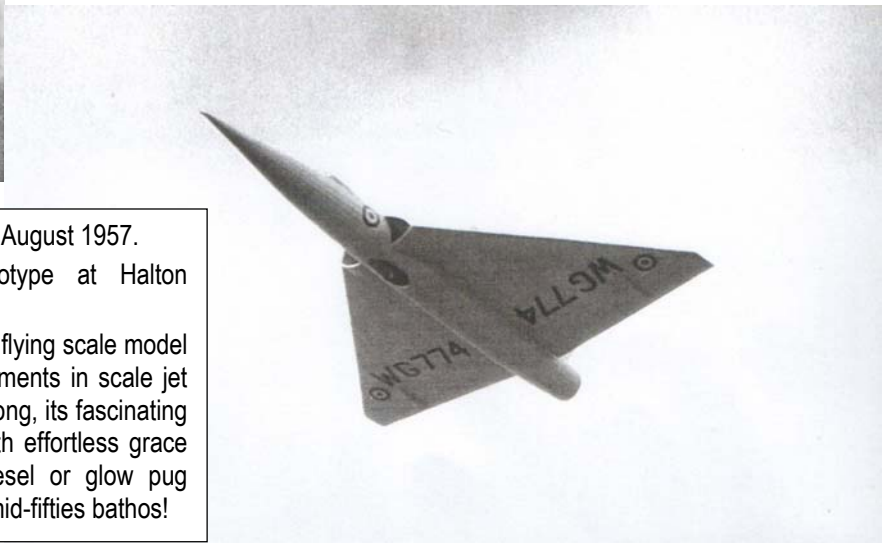
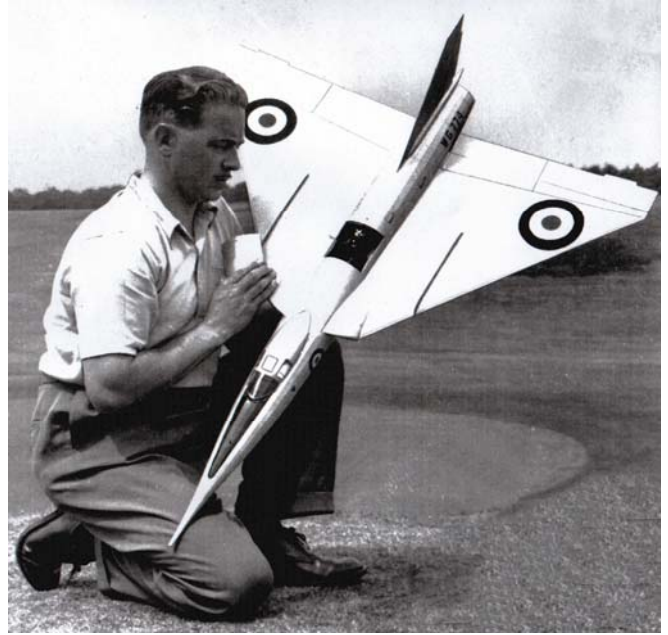
In common with all Jetex products, it was most attractively presented in a colourful box — a 'nose pressed up against the model shop window' object of desire for schoolboys. It was, alas, usually beyond their pocket money!

Which was a pity. The FD 2 was, for a variety of happy circumstances, one of the best of the series and an excellent introduction to scale modelling. Jetex claimed in their adverts, "Tailored kits have all the difficult jobs done. All parts are ready cut to shape. You simply assemble to the plan and instructions. If you can glue you can build", and this really was true of the FD 2. Apart from the beautiful balsa fuselage shells, it had other, plastic, moulded parts, including a canopy, air intakes, and a tough, if somewhat dangerous, nose cone. The fin and wing were shaped from sheet balsa and easily aligned on the simple fuselage. The elevons were hinged as a trimming aid. If the modeller could resist the temptation to apply too many coats of silver 'Brushing Belco' it could also be built below 1½ - 2 oz ready to fly. It did not disappoint at the flying field: not only did the reflexed delta wing provided a large amount of wing area (32 sq. in.) and hence a low wing loading, it was also exceptionally stable in flight. The thrust of the small motor, though less than an ounce, was enough to give it a sparkling performance.



Top: The alluring FD 2 kit (1957). It cost ten shillings and nine pence in old money. As the complete motor cost at least as much again, this was a considerable outlay for a young boy. **Bottom:** Mike Ingram's original drawing. Note the moulded fuselage halves, active (scale) air intakes, enclosed motor and augmentor tube, and the all-sheet wing with turned up ailerons to provide reflex. The alignment jig was assembled from interlocking pieces of sturdy cardboard.

Though Veron had produced several Jetex-powered models, including four jet fighters, they chose ducted fan propulsion for their FD 2. Axial and centrifugal impellers had been around for some time, and some experts like P E Norman had had some success with them, but only Phil Smith, the chief designer at Veron (aka Model Aircraft, (Bournemouth) Ltd.) was able to produce a practicable commercial product in the 'Imp'. Prior to the FD 2, Phil had designed a ducted fan Lavochkin La 7 and an F-86 Sabre: with this experience, he was able to go all-out to produce a realistic model.



Top left: Veron advert, *Model Aircraft*, August 1957.

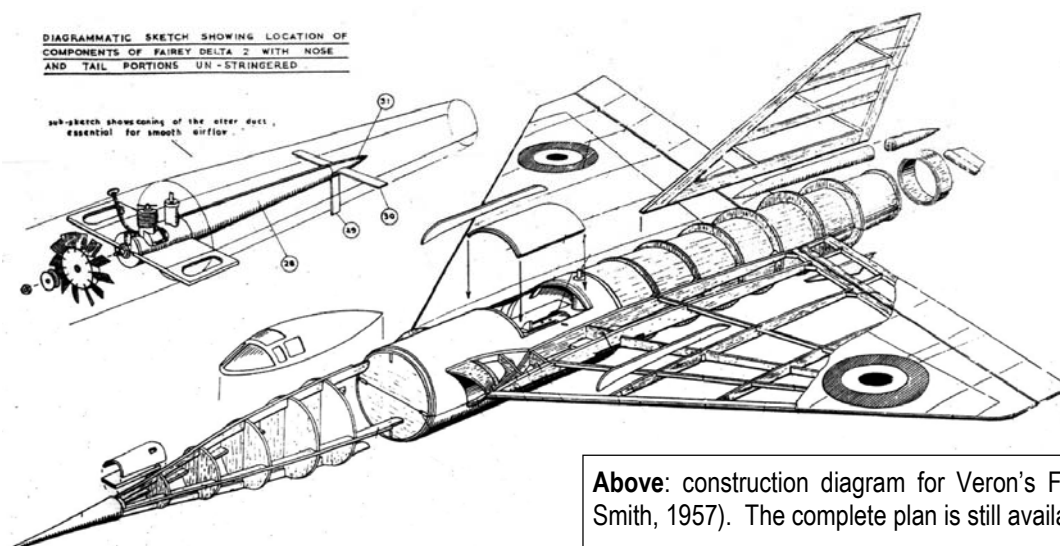
Top right: Phil Smith with prototype at Halton Aerodrome in 1957.

Right: An original caption reads: "This flying scale model heralds one of Veron's finest achievements in scale jet flight. 38 inches span and 48 inches long, its fascinating needle-nose delta soars overhead with effortless grace propelled by with 1.0 or 1.5 cc diesel or glow pug motors". Hmm, ... a nice example of mid-fifties bathos!

As can be seen, the size is impressive, especially for a free-flight model, and, as the evocative flying shot shows, there can be no doubt of its realism in the air.

The prototype weighed about 14 oz and was powered by one of the lighter and better-performing 1 cc model diesels of the day, the AM 10, which drove a 3¼" impeller at 16,000 rpm. The efficiency of impellers depends on sufficient air entering the plenum chamber from the (slightly over-scale) air intakes, and the FD 2's rather long jet pipe could only have added drag. Phil Smith comments: "The actual thrust of the prototype was not calibrated, It was not very great", but, he adds, "this did not matter – with all that wing area it was in effect a powered glider". Ducted fans give little thrust in static conditions, and a contemporaneous photo shows the FD 2 being given a vigorous launch. Phil believes that well over a hundred of the kits were sold, though it is of course not known how many were completed and flown!

The Veron kit was reviewed in 'Over the Counter', *Model Aircraft*, August 1957: "Veron's earlier models are joined by an accurate model of Britain's World record holding Fairey Delta 2 research aircraft, costing 48s 6d. The kit is semi-prefabricated and the quality is excellent. Assembly is aided by Phil Smith's excellent plan and many detailed perspective sketches. Obviously, a lot of work and original thinking has gone into the design and even if you are an old hand you are well advised to follow the instructions closely . . . you will then be rewarded with an interesting and out-of-the-rut model which is a sure crowd gatherer at any model meeting".



Above: construction diagram for Veron's FD 2 (Phil Smith, 1957). The complete plan is still available.

Construction, though 'traditional', is quite complex and not for the faint hearted!

The wing has a proper aerofoil and is built up with movable elevons, which are adjusted during trimming. The fuselage is essentially a plywood tube with stringers over formers. With all that area, the model was lightly loaded, but power was limited and tissue covering with a light finish was recommended.

Left: Axial ducted fans are notoriously inefficient until they get up to speed: Phil Smith gives the FD 2 a vigorous 'heave-ho' at Halton in 1957. Note the blurring of the spectators in this vintage action shot!

Though neither the Veron nor the Jetex FD 2 could be called 'super-scale' by today's standards (the subtle shape of the canopy in particular appears to have been difficult to capture) both pushed the model technology of the day to their limits and were outstanding achievements.

The authors have been unable to find any other flying kits for the FD 2 – but there is one interesting footnote to the FD 2 model saga. The British government was apparently unimpressed with a combat aircraft derived from the FD 2, and Fairey liaised with Marcel Dassault, who produced a delta wing Mirage I research aircraft in 1956 and the very successful Mirage III fighter in 1958. Jetex was popular in France, and at least one kit manufacturer responded.



Above: 'CB' in France produced a kit for the Mirage III in 1958. This was as attractive as the Sebel FD 2.

Right: The Mirage III was, like the Jetex FD 2, powered by the Jetex 50, but was otherwise a much less sophisticated model, being of traditional 'stringer and tissue' construction. The motor was mounted not internally, but (somewhat unrealistically) on underside of the fuselage. Nevertheless, this was a splendid model that could have flown very well.

The 'family' resemblance to the FD 2 is obvious.



Replicating vintage FD 2 models in 2006

By the late fifties, the popularity of Jetex was waning, and their products had all but disappeared by the end of the Sixties. Veron, with its larger portfolio, continued longer, but small ducted fans with i/c engines were never easy or popular. However, Phil Smith is still selling plans for his unique model, and it is eminently suitable for the highly engineered and powerful electric ducted fan units now available. There may even be room for micro radio control. I look forward to seeing at least one on the flying field soon.

Curiously, the smaller Jetex FD 2 presents even more of a challenge. Whilst the reproduction of the moulded balsa wood fuselage is difficult but not impossible, a greater concern is the means of propulsion. The modern equivalent of Jetex rocket motors, the 'one shot' cardboard-bodied Rapier units, are more efficient, but the compatibility of their hotter exhaust with augments tubes is still uncertain. In consequence, the modern rocket-propelled FD 2 models so far seen have 'played safe', with traditional 'stringer and tissue' construction, and, reverting to a technique invented by Phil Smith before the introduction of augments tubes, motors mounted in aluminium-lined troughs under the fuselage.



Two modern rocket-powered FD 2 models:

Above left: Pete Smart's Rapier L2 powered FD 2.

Above right: The author's (RJS) FD 2. Note the aluminium-lined trough in the underside in which the Rapier motor can be hidden.

Both models are of traditional balsa wood construction, with wing spans of 10-11" and weights below 1 oz (28g).

Right: despite their small size, rocket powered free flight 'jets' have a spectacular performance and offer an aeromodelling thrill unattainable by any other means, Pete Smart's FD 2 over Old Warden with full afterburner!



This modest booklet can only outline the history of Jetex and other types of reaction-propelled models. Nor can it do justice to the modern 'jet plane' free flight scene. If you would like to know more about Tailored models, Jetex motors and their modern equivalents, please visit www.jetex.org, where you can find this, and much, much, more.

Articles on vintage and modern model jet planes appear monthly in *SAM Speaks*, the Journal of the Society of Antique Modellers, and two books of essays are available from Dr R J Simmonds, 19 Gunners Park, Bishops Waltham, SO 32 1PD

Acknowledgements:

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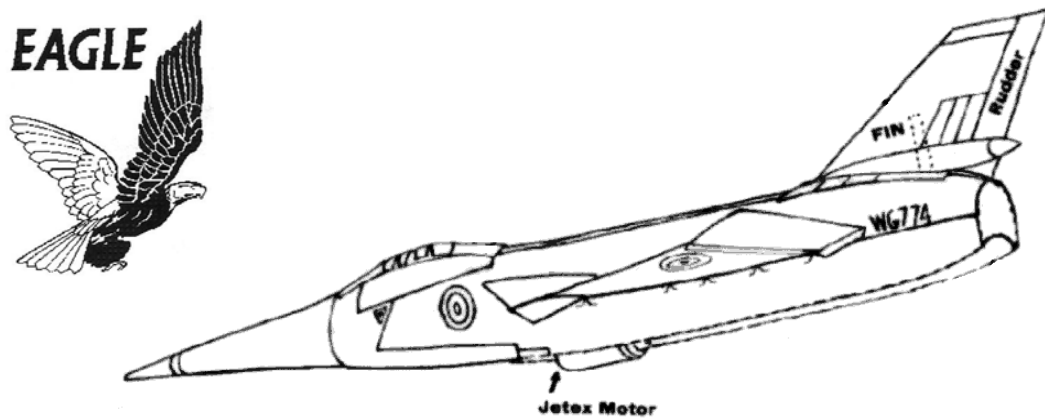
Appendix

As has been recorded in the main text, Sebel offered a promotional 'free gift' of a cardboard FD 2 in the popular boys' comic, the *Eagle*, and (possibly) via the backs of certain breakfast cereals. This model, though very attractive, was undoubtedly over-complex. It was, however, attempted by at least one small boy. John Parks wrote the delightful reminiscence below, which captures something of the excitement we felt at the time. Happy days, made happier by events like these!

"I knew something pretty special was going on before the news of the 1,132 mph record came out. I was out [model] flying one morning in 1956 when I was astonished to see a single thin vapour trail high in the sky to the South, made by an aircraft moving at least twice as fast as I'd ever seen an aircraft move, at its head. I was still wondering about it a couple of weeks later when the news broke and all was explained. Peter Twiss's autobiography talks of making dozens of flights close to Mach 2 before the record was set, and I'd obviously seen one of them from my home in West Surrey.

Incidentally, I actually made one of those cardboard FD 2's you could get from the *Eagle*. I assembled it using 'Lepage's liquid glue' as I reckoned balsa cement would distort it. It looked pretty good, but weighed a ton and I never tried to fly it".

Replicas of the cardboard FD 2 (below) are available from the authors.



Steve Bage is drawing up a new plan for a Rapier-powered FD 2 based on the designs of Mike Ingram, Pete Smart and Roger Simmonds. It is envisioned that several versions, from traditional 'built up' to fully moulded with enclosed motor, will eventually be available. If you would like a plan please contact the authors or go to the Jetex.org website.

