Smoke Trails no 21

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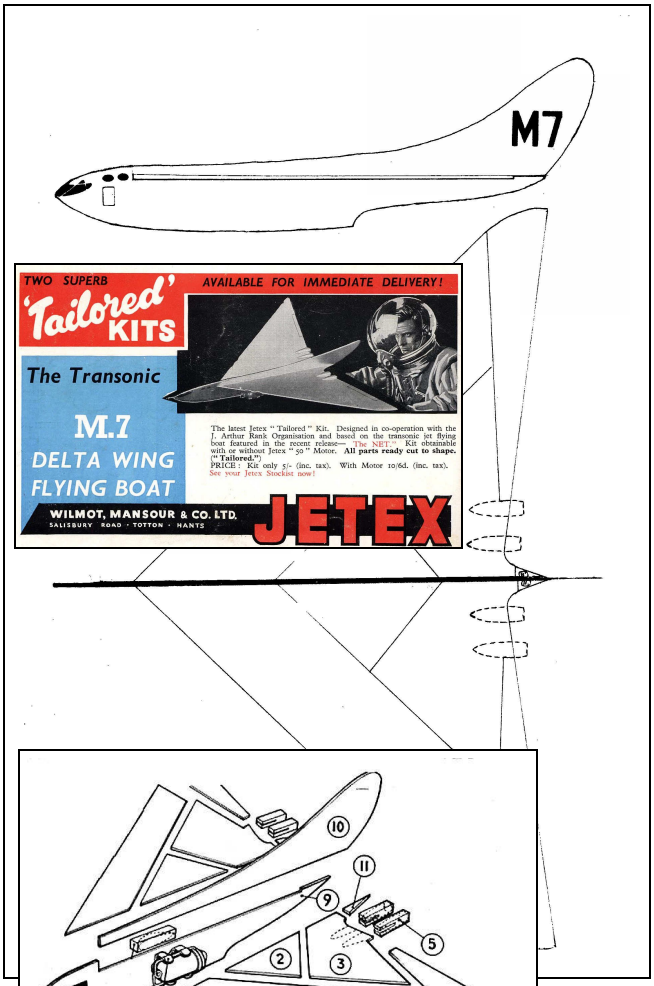
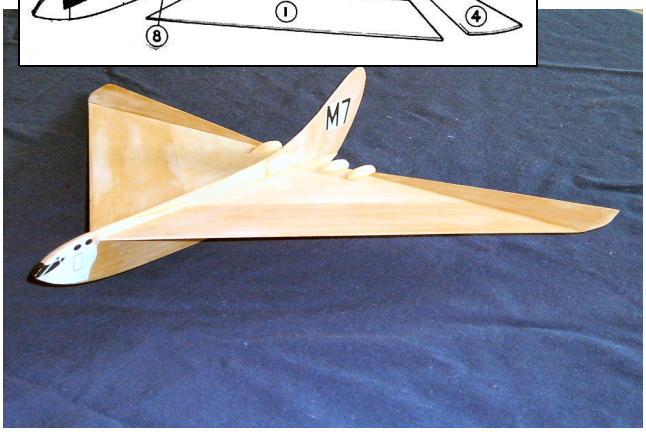
The M7 Flying Boat





Top: At last! A plan for Mike Ingram's M7; A 1953 advert is inset. **Bottom**: The first M7 in over fifty years awaiting flight trials. I hope these will not be sabotaged as they were in the film!

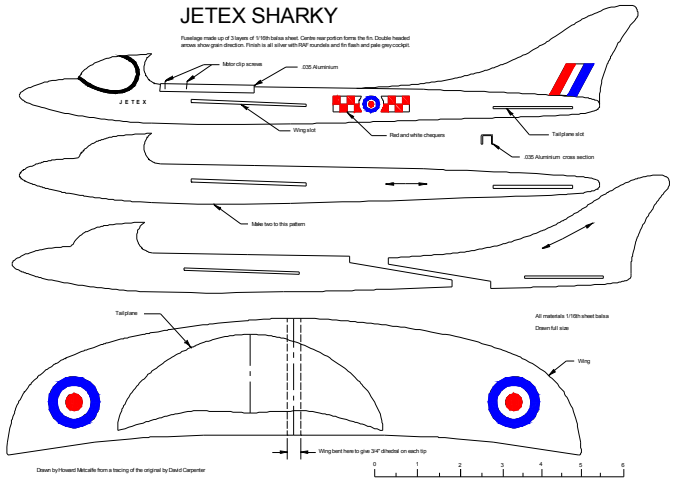
Readers who remember my earlier animadversions with respect to profile models, 'scale' or otherwise, may well treat themselves to a wry smile on behalf of the late Stan Pearson at my current enthusiasm for the genre. *Smoke Trails 19* featured the box art of the Jetex M7 Flying Boat, and I lamented that I had been unable to track down an actual example of the model to enable replication. This brought forth an unexpected but most welcome package from none other than Mike Ingram, who writes: "I hear an M7 kit has proved a trifle elusive? You should have contacted the designer! David Carpenter (or was it Bert [Judge]?) told me of your quest.

When I left Sebel, they let me have one of each of the kits I designed, which included the M7. All these were put on show in the 'Model Shop' at the Solent Sky Museum. Unfortunately, some selfish b*st**d stole most of the parts from the M7 box, leaving just the transfers, 4 nacelles, sandpaper, a tin of wick and the Jetex 50 instructions! Luckily, the back of the box has an exploded view of the parts and a drawing of the completed model.

So from these I have made some rough plans which I am sending you, with a scan of the instructions. You may have to alter things here and there to make it right, but I'm sure you will be able to come up with a superb model!"

Mike's package did indeed include everything necessary for replication of a real model. His drawings with an exploded view of how all the parts fit together is shown top left, and my superb model is shown bottom left.

Above: Another view of the legendary M7. Note the prominent jet pipes of the 'atomic' motors, which gave it a performance of Mach 4 at 90,000 feet. I wish.



Above: Recreations of Mike Ingram's 1953 Sharky. Not quite 'ARTF' by today's standards, the die cut balsa sheets were unpainted; those for the fuselage needed laminating and the wings had to be cemented together before slotting in. Kits were otherwise complete with cement, motor, asbestos sheet, fuel, wick, and those distinctive decals.

The various bits of balsa, $^{1}/_{16}$" for the wings, and fin, $^{3}/_{16}$" tapering to $^{1}/_{16}$" at the rear for the hull, went together well and the seemingly over-complicated wing is nice and stiff. According to Mike, the finish should be silver overall. The transfers are simple but effective, just a large 'M7' for the fin and the cockpit glazing. At the moment it weighs a little under 16g without noseweight, motor or a final coat of silver, so I'm hoping it will come out below 25g 'ready to go'. At 16" span and 12.5" long, it is quite large for a Jetex 50, but I'm sure it will go well with a Rapier L2, – if not quite matching the performance of its fictional counterpart!

A Brace of Sharkies

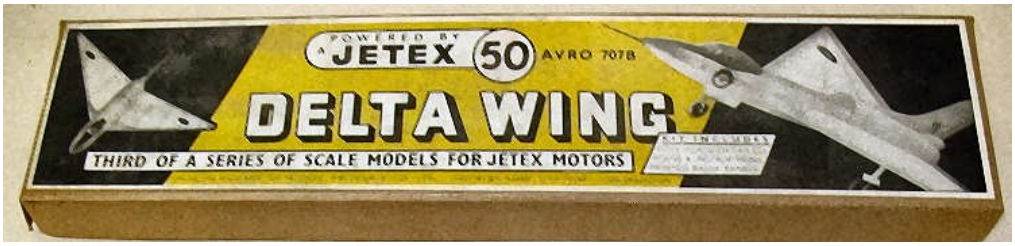
Being 'on a roll', so to speak, with Jetex profile models, I decided to build not one, but two, full size Sharkies (13" span and 13.5" long) – one for L2 and the other for my recently-acquired Jetex 50s. The 'plan' (left) was drawn up by Howard Metcalfe from tracings of the original parts by David Carpenter. $^{1}/_{16}$" balsa sheet was used throughout: note that the fuselage is a clever lamination of four parts, thus allowing the optimum orientation of the grain for the fin. They were finished with a couple of coats of clear dope and a light dusting of silver. Not having access to the originals, the transfers, which give this model so much of its character, were also recreated from Howard's drawings.

I thought it wise to add (inauthentic) foil to the Rapier powered version, and the Jetex version has two laminations of (authentic) asbestos sheet under the mounting clip. The former weighs 14g with motor mount but without noseweight (say 23g ready to go with new motor), the latter 24g with empty motor (say 30g ready to go).

A Jetex 50C in its prime will deliver quite a bit more thrust than your average L2, but whether this will compensate for the extra 7g on board remains to be seen. A proper comparison (i.e. one where the performances of the motors are consistent and can be estimated) will be a fascinating exercise and put my assertion that 'Old Jetex models fly better with Rapiers' to the test.

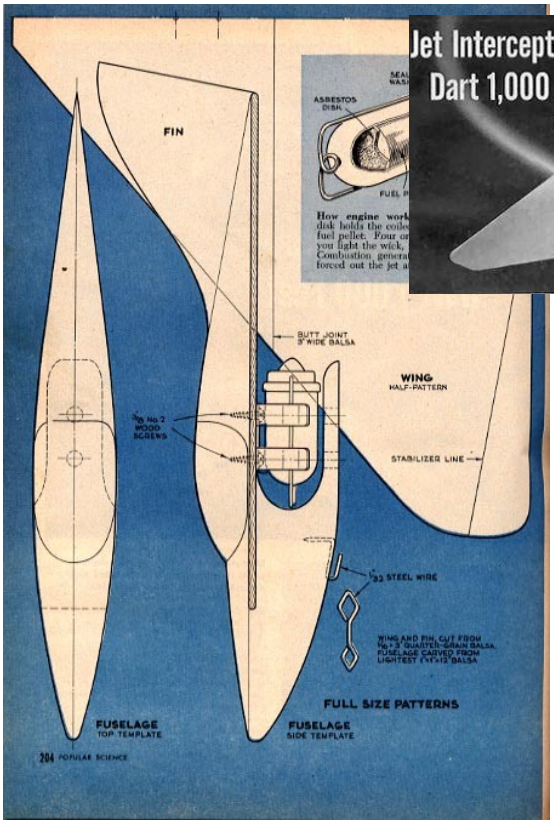
Delta Dilemmas

Though invented by Dr A M Lippisch and others in the late 1920s', the delta wing became well known only after WW II, when it was seen as an answer to most of the problems associated with high speed flight. Modellers were not slow to imitate this 'modern' configuration, especially for Jetex propulsion, and Kit manufacturers were not far behind: Wilmot Mansour claimed their Avro 707B was the 'World's first scale delta'.



Keil Kraft and Skyleada followed suit with their own 707s (Skyleada also made a superb 698). In contrast, Telasco produced a much simpler and robust model more suited to the beginner. Their 'P13 Delta Wing Fighter', obviously much influenced by the contemporaneous Convair XF -92, follows Dr Lippisch's design criteria very closely indeed.

Left: the early Telasco P13 consisted of a handful of bits of $^{1}/_{16}$" die cut balsa and is as simple as one can get. No designer is credited on the rather crude plan. The fin looks a little large to me.



So deltas were definitely 'in the air' in the early post-war years and magazines, even non-specialist ones, reflected this interest. For example, Jack Wilson published this nice design, for Jetex 50 in *Popular Science*, May 1951.

However, designs were published, and kits marketed, with little understanding of the peculiar flight characteristics of deltas and the potential difficulties of trimming them. To remedy this, John Fozard published a series of articles in (*Aeromodeller*, (Feb 1953 and after); but Lawrence Conover and Dr Lippisch himself (whose photo adorns the top of this page) published a comprehensive article in *Model Airplane News*, December 1951. Dr Lippisch, having been responsible for the Me163 and the later XF-92 knew well thereof he wrote, and his article is well worth reading today, especially for its trimming tips.

Having dealt with forward fins, ('just enough' is recommended to keep the nose up in a 'bad turn'); tip fins, (helpful in preventing tip stalling); the position of motor (above and forward of the cg); thrust vanes, (these Dr L pertinently, if insensitively, notes worked well in steering German rockets!); problems associated with overpowering, (continuous loops, to be avoided); and calculating that a Jetex 100 travelling at 6,000 mph is delivering one horsepower, he brings into question an old aeromodelling shibboleth, viz: ─ 'lightness is all".

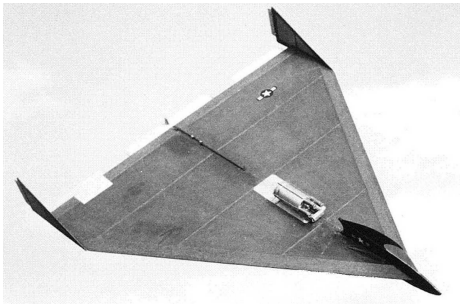
Dr L's cogitations are particularly pertinent to a SAM flyer contemplating using a light Rapier L2 in lieu of a heavier Jetex 50 to power his latest M7 delta-winged Flying Boat. Below is the relevant passage from this seminal article:

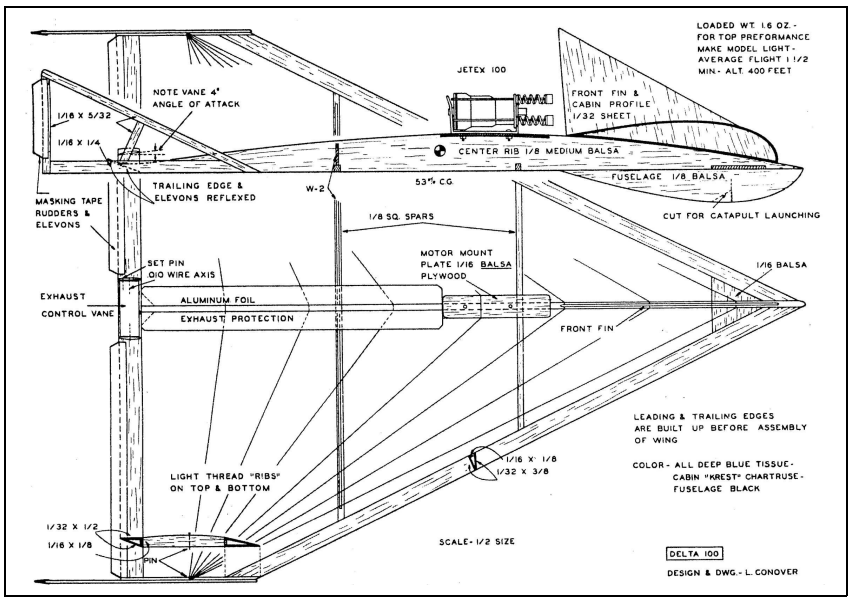
"One of the very important things we found out was the effect of Reynolds numbers on some of these small models . . . our delta models attain fairly high RN values because the wing chord is large and the rocket provides speed. Ordinarily you don't pay much attention to this factor on your models. We found that there are special times when you must. We had troubles adjusting the lighter models for the Jetex 50 but we attributed this to the flat plate section. The real trouble showed up when we installed a Jetex 50 in the new Delta 100 so that it would be easier and safer to check out for adjustments. Our problems started with the first glide. The nose kept plowing [sic] into the ground . . . using our standard full-length elevons the nose came up. But it [the problem?] didn't stop. Now all it did was stall.

No matter what we did it either stalled or nosed in. We tried turbulator strings on the wings and turbulator wires in front of the wing. But still no luck. It wouldn't even fly on its back [?] and still executed that beautiful slow approach to a stall so characteristic with delta wing designs. Ah, it must be the high tip fins, we thought, they break up the leading edge vortices, stall out the tips and cause the whole airplane to stall. Well it wasn't that either. We were apparently trying to fly on a margin that didn't exist. Nothing seemed to work and the model refused to fly. We got disgusted and decided to put the Jetex 100 on it and really 'plant' it [I take this to mean the chaps were going to give it a jolly good heave-ho]. The proper cg was arranged and the elevons set. One glide and we were amazed. Perfect! No stalls, no dives. Just straight flat glides. The answer was apparent. With the light weight of the Jetex 50 we had been trying to fly in an RN range where this particular size and design would not function properly. Why this occurred is a nice problem and is yet to be solved. As soon as more weight was added the RN went up and the model flew easily."

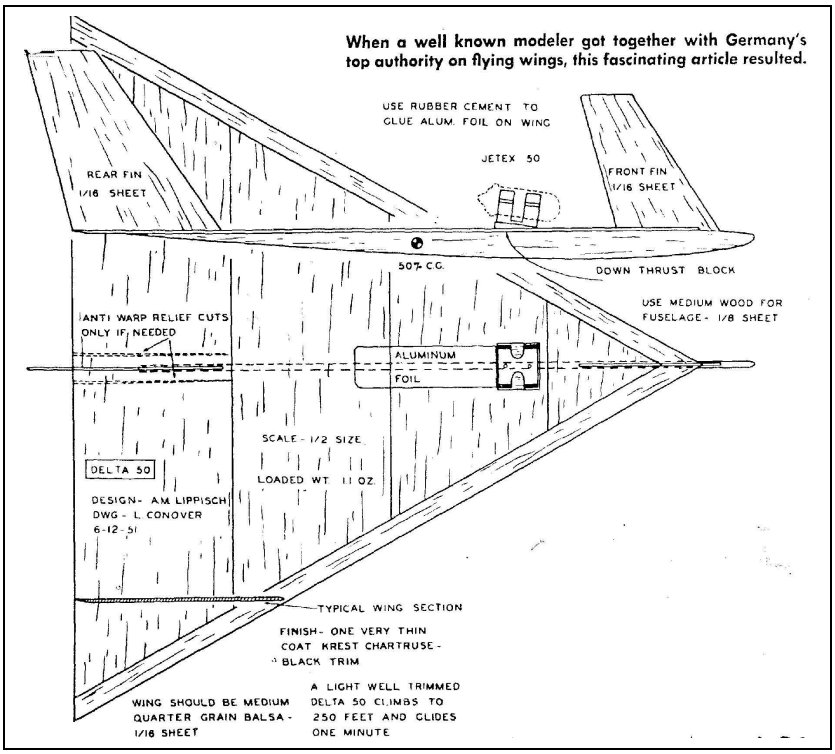
The above (slightly edited) excerpt is enough to give a flavour of what is a fine bit of writing that deserves to be better known. I now know that if my M7 flops about with an L2, I shall have to try a Jetex or add lead at the cg.

It is difficult, if not impossible to gauge the impact of this article on the 'modelling community' in the UK (US magazines were quite difficult to get hold of at the time), but a Jetex 100-powered delta in the 1952 Jetex Contest clearly shows Conover's influence. According to the *Aeromodeller*, Dec 1952, D E Smith's model was 'interesting', and flew well with a fast climb and a stable glide. Conover himself sent a Delta 100 derivative for the 1953 Jetex Contest, where it was flown by proxy by Mike Ingram.





Above: the problematical Delta 100 festooned with trimming aids. **Above left**: D E Smith, 1952. **Below left**: Conover's proxy entry for the 1953 Jetex Contest.



Left: The Delta 50 incorporates fewer trimming aids than the delta 100:, there being no turbulators, thrust vanes, (or apparently, elevons), but it does have a forward fin to prevent turns becoming spiral dives, tip fins, and a motor ahead of the cg incorporating considerable down thrust.

Though the text reads, 'a ***light*** [my italics] well trimmed Delta 50 climbs to 250 feet and glides for one minute', Dr L might well have thought an L2 too light for this one. However, other Rapier options may soon be available .

Rapier Reports

No, not exploding motors, though this is always a possibility with rockets, but an update from Steve Bage: "Danny Cane (of Shorty's Basement in the US) has been talking to Dr Zigmund, [the maker of Rapiers], and the news is that we will almost certainly not see any L2s this year. Dr Z's experiments impregnating motor tubes with resin were not a complete success – the failure rate was lower but still unacceptable – so he has pretty much given up on that idea. Using tubes from a different supplier is uneconomic as they would need to tool-up to produce casings to Dr Z's specification and require a massive minimum order (apparently tons of the stuff), that Dr Z can't afford. There is as yet no sign of a 'Plan B'. Instead, Dr Z is going to concentrate on production of L1s and L3s, and, to fill the gap left by the demise of the L2, produce an L3 with L2HP-like thrust but a longer run time (an L3-LT perhaps?)."

Hmmm . . . Whilst it is good that L1s will still be available, and I'm pleased the worst of Eeyore-like prognostications about the unavailability of L1s in 2009 was wrong, it would be foolish to forget that recent batches of L1s have not been without problems, with difficulties of ignition and variable thrusts. Still, (looking on the bright side) an 'L3-LT', or at least a reliable and not too expensive one, is an interesting option. What we could have here is a motor about the same weight and thrust as a Jetex 50C but a burn time of 30 seconds. L3s weigh 14g; a 50C could deliver up to about 270mN, and weighed 16-17g when fully charged. Steve opines: "This new 'L3-LT' could be the silver lining to the L2 cloud and prove a 'killer motor' for duration models and the larger end of range of L2 scale models. I'm sure most of my L2 designs would go ok on these new motors . . . if they live up to the billing".

Notice the sting in the tail of Steve's otherwise sanguine reflections: the worry is of course that the quality of some L3 batches has not been that good either, with reports of casing burns-through, variable and very low thrust (one correspondent thought they would make 'good smoke generators' but were useless as propulsion units). However, André Bird uses them all the time in his idiosyncratic creations, Mike Stuart loves his L3-powered 'Big Fat Tunnan, and Chris Richards has also been using modified L3s successfully this year. Chris drills out the nozzles a tad to reduce the back pressure and prevent the front plug from blowing. It seems to work well for him: the sight of his L3-powered MiG 29 crackling impressively across the Old Warden sky is one I shall long remember and a performance I would dearly like to emulate. So once it is confirmed this putative L3-LT is available (and a half-decent product), I shall build an 'EasyBuilt' Venom or a115% Keil Kraft MiG 15 and see how they go. And here's a thought – I could also try them in my new M7 Flying Boat – half an ounce of motor could well provide the extra Reynolds Numbers it might need!